Inside the Postdigital Crowds

The aesthetics and politics of the mediation and governing of digitised crowds.

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Signed……Anna Ådahl Date……..

Abstract

This practice-led research analyses and explores, through different artistic mediums and processes, the aesthetics and politics of the mediation and governance of crowds in a postdigital era. Through material and physical articulations it addresses the urgency of a phenomenon where the employment of computational tools and mechanisms representing and governing today´s crowds and collective behaviour are becoming increasingly opaque while facing political and ethical dilemmas. The outcomes of this research proposes a new embodied understanding of the agency of the postdigital crowds.

The specific inside approach inherent to the present postdigital condition, is articulated throughout the research and embodied within the practice. Using a 'post-individualistic' perspective enables this research to think beyond today's intensified individualism and deploy a collective understanding of these crowds while shedding light on their fragmented and atomised online and physical existence.

The key terms and notions of 'default' and 'flow' are central in the methodological investigative nature of the research. They act as guiding clues exploring the links between the digital operations of crowds and contemporary economic currents and political strategies while establishing a direct correlation between written theory and the embodied and spatial articulations of the practice. A methodological approach which helps to identify the corporal ramifications and instrumental role the employment of these key terms and the digital tools have on the crowd and collective behaviour.

The postidigital crowds are analysed through their digital representations, media and technologies, such as crowd simulations for film and computer games (the latter in partnership with the gaming company Ubisoft), as well as multi-target tracking systems.

Through embodied experiences, this practice-based research uses multiple mediums in the form of spatial narratives, such as sculptural installations, collages and performance where the organic human body is used as reference and tool of investigation. This unravelling uses a process of re-mediation to physically understand the postdigital conditions in which the crowd operates with the aim to materialise the immaterial from a critical standpoint while making visible the dissimulated articulations and strategies enabled by computational technologies. The data generated from these various methods of approach are synthesised in a series of

essay films forming the core of this research. These films propose an associative and critical analysis of how digital governance of the crowds are modelling the politics of future collective behaviour.

In a postdigital era with a 24/7 online life and working body, framed within an accelerated economy affecting our collective behaviour and production modes, this practice-led research attempts to contribute an experienced understanding of the aesthetics and politics of the digital governing and modellations of crowds. By using various artistic media and methods this research establishes a multi-faceted and embodied analysis articulated in various spatial and visual outcomes on the conditions and agency of the postdigital crowd subject.

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List of Accompanying Material/Portfolio of Practice

See also attached file: Images for Portfolio of Practice

DEFAULT CHARACTER (2016)

13 min

HD video film

available at: https://vimeo.com/194514816 (under construction, please contact me for film)

Website: https://www.annaadahl.com/works/default-character-2016

Synopsis: The film *Default Character* focuses on the vocabulary, tools and human representation in the various types of softwares that is used for modelling and tracking crowd behaviours.

List of images:

1. Film still
2. Film still
3. Film still

Exhibitions and screenings: Anna Ådahl: Inside the New Mass Ornament, Whitechapel Gallery, 2016; Night of Philosophy, Moderna Muséet, Stockholm, 2019; Rencontres Internationales Paris/Berlin, Forum des Images, Paris, Haus der Kulturen der Welt, Berlin, 2018; Flux/Flow, Techne Congress, Chelsea School of Art, 2017

DEFAULT CHARACTERS (2018)

solo exhibition at Marabouparken Art Gallery, Stockholm. May-September 2018.

Website: https://www.annaadahl.com/works/default-characters-2018

Default Characters was a solo exhibition entirely dedicated to my ongoing research and featured six newly produced projects in various mediums, investigating the

computational modelling tools for crowds such as crowd simulation softwares and the human multi-tracking systems.

Featured works:

Di-Simulated Crowds, 2018, film.

Locomotion Diamond, 2018, large size sculpture in metal and straps.

And or Or, 2018, performance.

Invisible Infrastructures, 2018, collages

Default Character 1-2-3, 2018, sculptural 3D printed busts.

Homogenous Mass, 2018, installation with sand and endoscopic camera

List of images:

1. Installation view at Marabouparken Art Gallery.
2. Installation view at Marabouparken Art Gallery.
3. Installation view at Marabouparken Art Gallery.

DI-SIMULATED CROWDS (2018)

HD Video and video installation

15 mins

available at https://vimeo.com/267534688

Password: triptyk

Website: https://www.annaadahl.com/works/disimulated-crowds-2018

Voice over transcript: separate document.

List of images:

1. Installation view in exhibition Default Characters, Marabouparken Art Gallery, 2018
2. Installation view in exhibition Default Characters, Marabouparken Art Gallery, 2018
3. Film still
4. Film still

Represented and acquired by the Museum of Modern Art, Stockholm since 2021.

Exhibitions and screenings: Di-Simulated Crowds has been exhibited and screened in solo exhibition Default Characters, Marabouparken in 2018; Haus der Kulturen der Welt, Berlin and at the Gaité Lyrique, Paris, within the framework of festival Rencontres Internationales Paris/Berlin in 2018; Visions Bleeding, Royal College of Art, 2018; The Royal Institute of Technology within the framework of lectures series Human Tech in 2019; in the group exhibition ARTworlds/Scena 7 in Bucharest within the framework of the International Wrong Biennale, 2020.

DEFAULT CHARACTER 1-2-3 (2018)

Sculpture

3D printed life size busts in polyurethane and unhardened clay. The 3D printed clay bust is developed and executed by RISE Interactive at the Northern WASP Hub in Umeå.

Website: https://www.annaadahl.com/works/default-character-1-2-3

List of images:

1. Default Character 1, polyurethane plastic
2. Default Character 2, unhardened white clay.
3. Default Character 3, polyurethane plastic
4. Installation view of sculptures in exhibition Default Characters
5. Installation view of sculptures in exhibition Default Characters

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IN-VISIBLE INFRASTRUCTURES (2017-8)

Digital collages in various formats printed on paper.

Website: https://www.annaadahl.com/works/in-visible-infrastructures-2018

List of images:

1. Collage 1 (available as poster), Collage 2
2. Series of collages 3-4-5-6 printed on Japanese vintage paper.

The collages were exhibited in the solo exhibition Default Characters but were also published in OEI magazine n. 77, 2017.

THE LOCOMOTION DIAMOND (2018)

Sculpture 250 cm x 700 cm

Metal, textile strap band

Website: https://www.annaadahl.com/works/the-locomotion-diamond-2018

The sculpture is a translation, remediation of the crowd simulation software triangular shaped control operator for the velocity and motion of the crowd.

List of images:

1. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
2. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
3. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
4. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm

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AND OR OR (2018)

Performance

4th of May and 16th of August 2018 at Marabouparken Art Gallery, Stockholm.

Performers: Rebecca Chentinell; Andrea Svensson; Sybrig Dokter; Pelle Nilsson.

Video documentation of performance with and without audience:

available at https://vimeo.com/272562739

available at https://vimeo.com/272561900

List of images:

1. Image of performance in in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
2. Image of performance in in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
3. Image of performance in in exhibition Default Characters, Marabouparken Art Gallery, Stockholm

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HOMOGENOUS MASS (2018)

Installation composed of sand from various locations, macro photography camera, screen.

Website: https://www.annaadahl.com/works/homogenous-mass-2018

List of images:

1. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
2. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm
3. Installation view in exhibition Default Characters, Marabouparken Art Gallery, Stockholm

Exhibited in solo exhibition Default Characters at Marabouparken Art Gallery, Stockholm, 2018.

THE POWER OF FLOW. THE FLOW OF POWER (2020)

HD video

18 mins

available at https://vimeo.com/386927993

Password: flow

Website: https://www.annaadahl.com/works/the-power-of-flow-the-flow-of-power-2020

Synopsis: Through an immersive experience the film addresses how the notion and term of flow and state of flow have been monetised by our current economy and accelerated society of 24/7 consumption, production and performance.

List of Images:

1. Installation view Pylon Lab
2. Film still
3. Film still

Exhibitions and screenings:

A Crowded Sky, group show at IMPAKT in Utrecht alongside works by artists Clemens von Wedmeyer, Lawrence Lek, Tools for Action och Lantian Xie & Jaebum Kim and curated by Jasmijn Vissr and Stefan Schäfer.

MASS, group show at Pylon Lab, Dresden, alongside artists Boromir Doringer and Clemens von Wedemeyer. In this show the work in progress *State of Flows* (a

collaboration with choreographer Rebecca Chentinell) was also exhibited together with the film.

Rencontres Internationales Paris/Berlin, art and film festival, online from The Louvre in Paris in February 2021 and in Berlin at the Haus der Kulturen der Welt in August 2021.

The film was also screened within the context of a webinar I made within the context of Walking during Lockdown organised by Walkative Society and during an online lecture at The Royal Institute of Technology in Stockholm in January 2021.

Acknowledgements

This research has been a wonderful and an enriching voyage as well as an extended journey due to the pandemic in 2020 and 2021. This unexpected situation has put strain on the making of the written contribution/thesis and the people and structures surrounding and supporting it. I therefore want to specially thank TECHNE and NPIF for supporting this research as well as extending its funding during the pandemic but also the Royal College of Art for the help and support during this time.

First of all a big thank you and gratitude to Esther Leslie and Jaspar Joseph-Lester for being dedicated and insightful supervisors guiding me in the right directions.

A special thank you to Stefan Jonsson for acting as external advisor giving valuable advice and believing in my work.

Patrick Bach at Ubisoft for our numerous discussions and exchanges and Alexander, Ben and Stratis for sharing their valuable knowledge on AI and animation.

Ellen Wettmark and Hans Rosenström, thank you for your friendship, kindness and hospitality during my stays in London. And Amelie Mallet (with family) for your warm hospitality, wit and support.

Bettina Pehrson, director of Marabouparken Art Gallery, for believing in my work and allowing me to explore my research and related art practice in the solo exhibition *Default Characters.* As well as the whole team (Karin, Cecilia, Fredrik and Elin) at Marabouparken for helping produce and installing the artworks.

My thanks extend to colleagues and dear friends with whom I have had vivid conversations and collaborations during this PhD journey and who have in different ways lent me their moral and intellectual support: Janina Lange, Laura Grace Ford, Pauline Van Mourik Broekman, Filipa Ramos, Anja Kirschner, Emma Kihl, Diana Kaur, Eva Arnqvist, Ingela Johansson and Fanny Stenberg. Clemens von Wedemeyer for our conversations and exhibitions.

Last and not least, my family, Kim and Iris, who have been my pillars and who have fed and endured me during these strenuous times of not only work but also numerous travels and absences. A special shout out to my mother for her unconditional support and presence.

And a special acknowledgement to Azadeh Fatherad who pushed me into undertaking this journey in the first place.

Preface/Overview

This practice-based research project uses artistic practices and processes in various mediums to analyse the aesthetics and politics of crowds in a postdigital era.

In the production of this thesis, the art practice and theoretical writing have been evolving in parallel and in dialogue. I have sought to let their different heuristic frameworks confront and complement one another, as parts of a composite yet integrated methodological approach. A sensorial, and experience-based knowledge of artistic practice with the abstractions has been combined with the speculations of theoretical reflection.

In order to study digitally operated crowds in their proper conditions, this research project actively affirms its situated and embodied perspective. The project is conducted from within a postdigital reality, a reality itself integrated with the circuits of global capitalism. In the twenty-first century surveillance economy, every crowd subject is entangled with and defined by technologies that track and model its behaviour.

An "automated crowd" as a digital, operational representation of an "organic", analogue crowd, generated through tracking, data-gathering, and modelling of that organic crowd and its subjects. The automated crowd is, within this research, considered as a crowd constituted by multiple, digitally "programmed" bodies. Any attempt to approach the automated crowd as both theoretical and practical research object must consequently account for the investigating subject's own situated and embodied status, and for the way the human body may function as at once a reference and a tool for investigation.

The artistic components of this research project use methodological processes and mediums appropriate to the specific topics or subjects of investigation, articulated in visual and material compositions, with the overall aim of producing a sensible and experienced rather than an exclusively cognitive mode of knowledge.

Among those artistic components are: transmediated sculptures and installations where digital forms have been translated from the immaterial to the material; scripted performances where professional dancers conjugate/reenact the behavioural grammar of digital agents; assemblage works based on documents and images drawn from online archives; and finally essay films that combine found footage and newly shot images using methods of intellectual and associative montage.

Already during the initial phase of research, it became clear that two concepts would be important for my work: the notion of "default" settings and options, and the concept of "flow".

These two concepts both name prominent strategies and mechanisms through which the crowd is today digitally mediated and organised. They have therefore served both as objects of study and as heuristic tools for my theoretical and practical investigations.

The first step of research consisted in identifying and mapping the crowds and the technologies relevant to the investigation. The first chapter studies the representation and the construction of these crowds through an analysis of a number of mediating technologies and platforms: crowd simulation software packages, and their connected databases, through which digital crowds are constructed; surveillance and tracking systems that employ associated techniques for dynamically mapping, governing, and organising "analogue" crowds; and the non-playing characters which composes the interactive "background" crowds in video games. This later study was made in dialogue with the gaming company Ubisoft via a partnership enabled by the NPIF TECHNE award (AHRC).

The second chapter seeks to understand how a crowd can be administered and its collective behaviour can be standardised, such that it can be operated and governed as a standardised *mass*. Most digital systems employ interfaces that individualise the user experience, establishing a personalised space where the user may exert a highly scripted and circumscribed mode of control. These interfaces are designed to be experienced as individualised, but are in fact systems of mass governance, programming the behaviour of thousands, even millions of people, depending on the platform's reach. By necessity, such operations of mass governance must make use of a limited range of default modes, in order to address the multitude of individuals in a "user-friendly" way. Those default modes may facilitate access and navigation, but are regularly interconnected with data harvesting systems that generate vast sets of data concerning user behaviours, from which patterns and predictive models can then be derived. Those patterns and models are in turn "fed back" into the user interfaces, further circumscribing the range of the user's autonomy, in the name of enhanced "user-friendliness" and utility.

"Automated" crowds are therefore operated first of all in default mode, since their size can range across millions or even billions of individuals. Consequently, a "default crowd" is not an average crowd, but a crowd operated by statistically informed, average-based systems. The average is not merely derived from the crowd, but informs default systems that govern the crowd's behaviour, which in turn affects the statistics that can be drawn from that behaviour, so that the "average" (a standardisation) is in fact also prescriptive, generating a "default crowd" (a phenomenon referred to in this research as the 'loop'). In crowd simulation software, default

modes create default agents acting together as default crowds, all in accordance with a library of predefined aesthetics and behavioural patterns.

In the artistic, practical components that correspond to this chapter, I have therefore devoted my attention to the programmed bodies of digital default agents available in crowd simulation software. Seeking to understand the "default" behaviours prescribed by these agents, I have studied their features, their physical traits, and the gendered choreography of their behavioural vocabulary. I have then translated and conjugated those forms and patterns into different mediums and materialities, seeking to reveal the ethical and political norms that they embody and enact. My aim here has been to set up a new choreography of analogies to explore contradictions between material and immaterial bodies, digital and analogue agents, where the latter draw from, enact, and diverge from the default modes set by the former, as can be seen in the performance *And or Or* (2018) and the essay films *Default Character* and *Di-Simulated Crowds* (2018).

The third chapter, finally, maps and analyses the notion of "flow", aiming to show how various "natural flows", on different scales – from the individual human body to planetary ecosystems – are being rechanneled in accordance with a profit-oriented logic, producing a range of effects with momentous social and ecological implications. In an accelerated, postdigital society, the crowd may become a vehicle of homogenising subject-formation, relaying social and psychic "flows" into a programmed, quantified, and performative "mass". I have sought to address these problems theoretically, but also practically, in two film-based works: the essay film *The Power of Flow, The Flow of Power* (2020), which uses an associative editing technique in order to generate an immersive yet critical experience of how micropolitical and macropolitical "flows" intersect and interact; and the performance film *The State of Flow* (2020), in which a performer enacts the antagonisms of the various, differently scaled "flows" that converge in and thereby constitute the human body.

By presenting the results of this research project in a variety of different discursive modes and aesthetic arrangements, my aim is not only to establish a theoretical understanding of the forms and instruments that are used to mediate and govern crowds, but also to facilitate an embodied, sensible and visual experience of those forms, and their political implications. In the end, this research project combines theoretical and practical modes of knowledge in order to establish a more complete and versatile image of the agency of the postdigital crowd.

Introduction

Figure 1- Digital crowd.

> 'The most important techniques invented in the last 150 years are the various systems for the management and control of human beings. '
>
> — Jonathan Crary, 2014[1]

When I started this practice-based research project, my aim was to understand the conditions in which crowds are operating and being operated today, in a postdigital era. How can art be used to capture what it means to be a member of a crowd under those conditions? In a

[1] Crary, J. (2014) 24/7: *Late Capitalism and the Ends of Sleep*, London: Verso Books. p.36

postdigital world of increased automation, the crowd tends to become a programmed collective body. Can a programmed body have a voice?

These questions pointed toward a more fundamental one, which has become central to this research project: what modes of agency are available to the crowd in a postdigital era?

The crowd's movements and actions on digital platforms, in urban space, and through various infrastructures are tracked by different data harvesting, surveillance, and satellite-based positioning systems, generating enormous data sets: a vast archive of behavioural patterns. This data has become valuable capital which can be bought and sold on different markets. Algorithmically processed, can also be employed for crowd management purposes, in predictive models and in designing crowd simulations. A feedback paradigm that I refer to as the 'loop' governed by ever-evolving technologies which – crucially – use the data they accrue to direct their own evolution. This paradigm has its origin in the 'adaptive systems' and 'feedback loops' of early cybernetic research (N. Weiner 1950, Macy Conferences 1946-53).

Understanding the ramifications of the 'loop' is central to this research project. I propose that we draw a parallel between the repetitive, spiralling aesthetics of the data accumulation cycle, and Siegfried Kracauer's thoughts in his "Mass Ornament" essay, where he understands the new spectacles of the masses as reflections of the logic of production in capitalist society, and where the new figures of the crowd could point toward the creation of a new political subject. Today, the data sets at the heart of the 'loop' are predominantly owned by a limited number of multinational corporations (the "big five"[2]), which are (close to) monopolising the market. In some countries the data sets are controlled by political regimes. Can we see an analogy between the monopolisation of data sets and linked technologies, and an authoritarian governance of the crowd?

The contemporary crowd navigates a world of complex technological infrastructures which are beyond the cognitive reach of any single individual, at the same time as they dissimulate the logics of their own operation, creating an intensified sense of alienation. The use of smart devices and the establishment of online lives create a digital and social filter: a distancing and dissociation between people that generates an atomised and fragmented crowd. Meanwhile the dominant producers of hardware and software and the major digital communication platforms are facing ethical and political dilemmas. There is consequently an urgent need for

[2] The "big five" are known as Google, Apple, Microsoft, Facebook and Amazon.

new ways of seeing, experiencing, and understanding these computational tools and systems, and the procedures through which they operate and model crowds.

The contemporary postdigital[3] (Cramer, 2015, Berry & Dieter, 2015) crowd operates in a global economic and surveillance system. The crowd's constituent subjects may be disenchanted (Cramer, 2015)[4] with the digital technologies which permeate and monetise their everyday lives, yet they remain unavoidably committed to them. In this condition, digital technologies can not be understood merely as tools: digital and analogue (physical) identities are more and more deeply entangled, subjects navigate a world of devices and technologies where online existence and 'real' life have merged into a symbiotic coexistence. Here, any critique must be immanent: it can not be enounced from the outside, but only from within, from the position of the user.

Such an inside position gives access to vast information networks, but it is also a position of exposure to control and manipulation. Paradoxically, to be a subject of the crowd here is to be atomised; to access information networks means to be separated from the complex systems through which they operate.

In this research project I seek to establish a critical position within the postdigital crowd. The criticality of this research proposes a post-individualistic mindset. Adopting such a standpoint is to attempt to think of ourselves beyond our customised environments and social bubbles, as parts of a bigger, globalised, connected crowd: an assembly of singulars with a collective and democratic consciousness, composed of subjects with agency. In sum we could say that this post-individualist position is the repressed yet constitutive condition of the operations of the global information networks.

Consequently, at the centre of this research is the crowd subject and the body in both its natural and digital state. While those two states are symbiotically entangled in a postdigital reality, what differentiates the digital from the 'real' is the physical body. Therefore, the

[3] 'The notion of the post-digital is used to acknowledge that, today, digital technology is deeply embedded in 'everyday life'. It serves to emphasize that 'the digital' is not as definite as we might assume: that it is no 'virtual reality' distinct from our everyday world, but a constitutive part of it ´ (Berry and Dieter, pp. 76-98)

[4] 'The term 'post-digital' can be used to describe either a contemporary disenchantment with digital information systems and media gadgets, or a period in which our fascination with these systems and gadgets has become historical´. Florian Cramer, *What is Post-Digital, Postdigital Aesthetics*, Palgrave Macmillan, 2015, ed. Berry, D., Dieter, M.p. 13.

observations and analyses of this research project use the human body as a reference and as a tool of exploration. The human body is itself not neutral since it archives and reflects the conditions in which it operates. Recently the terminology of 'bodies, in contemporary art, not only refers to the body as such, or as object, but as subjects. Bodies as (biopolitical) subjects which also bear witness of the vulnerable, precarious condition in which they are inscribed by the capitalistic system (Vischmidt, 2020)[5].

Through its inarticulate, corporal language the body speaks a truth: the truth of its vulnerability to and its wariness of the social, technological and economic system by which it is conditioned. It only communicates that inarticulate information through its presence in space, through the ways in which it occupies and modulates its physical and social surroundings. It is an information that cannot be read, only observed. Art may provide a way of spatially articulating what cannot be discursively, semantically enounced.

In accordance with such a critical inside position and with the need to grasp the dissimulated and complex technologies that operate the crowd, this practice-based research project studies the aesthetics and politics of the digitally mediated crowd. It proposes a combination of and a dialogue between multiple investigative and analytical frameworks, seeking to establish an embodied understanding of how digital technologies govern and simulate crowds, and for what aims. First of all, the artistic practice provides the embodied, visual, sensorial and material outcomes of the project. The theoretical components, in turn, historically and critically contextualise the artistic practice, weaving in social, political and economic references. Central to the project has also been my collaboration with the gaming company Ubisoft, a collaboration which took the form of a dialogue and study of the role of AI and of interactive digital crowds (NPC) in contemporary gaming culture.

In this research project, the art practice offers alternative routes into conceptualising the relation between digitality, AI and the crowd. I have sought to approach each subject of research with the appropriate artistic mediums, techniques, and gestures. In trans/re-mediated[6] installations and

[5]A thought drawn from what M. Vishmidt states in *Bodies in Space: On the Ends of Vulnerability*, 2020: ´…bodies' have reemerged as the centre of contemporary art and a general theoretical discourse as where the terminology of 'bodies' rather refers to them as subjects rather than objects. Subjects which bear witness of the vulnerable, precarious condition in which they are inscribed by the current capitalistic system. Emergent from the biopolitical discourse and in reference to the bodies of the multitude as described by Hardt and Negri ´.

[6] (Re)mediation 'They define remediation as 'the representation of one medium in another' (Bolter and Grusin 2000, p. 45). So if we think of Helmut Smits' Dead Pixel, emulating a bitmap error in the physical

sculptures, digital bodies and crowds were translated into space using various materials. In digitally assembled collages on paper, archival and internet-based images of crowd algorithms and of tracked and simulated bodies were combined and confronted with one another. In the performance works I establish a comparative analogy between the digital and the analogue body, playing on the similarity between choreographic scores and computer programming.

In this research project I have used various mediums to translate the digital into the 'real', in order to understand how automated operations, AI models and algorithmically governed tools impact upon crowd behaviour. Such a process of trans(re)mediation, translating immaterialities into material form, also serves to make visible the dissimulated operations and strategies that govern the function of interfaces and digital platforms. The postidigtal approach of this research was articulated in the combination of the digital and analogue which is inherent to the process of trans(re)mediation and the assemblage techniques used within the practice. An editing technique which also allows for various temporalities to meet.

The artistic components of this research project are developed as free-standing artworks in their own right, but are also designed to function as practice-based, spatial and visual articulations integrated in the overall investigation. In this sense they have a mediating purpose, linking the apparatus of academic and scientific legitimation with the apparatus of institutional and critical legitimation proper to the field of artistic practices.

The artistic components therefore demand interpretation, resisting complete hermeneutic closure, even while they are composed using fact-based data (material from online archives, found footage, etc.), the validity of which can be empirically verified. At the same time, the associative logic specific to certain kinds of art production – apparent in essayistic editing techniques or sculptural design, for example – has informed the development of the research project as a whole, linking the rigorous process of scientific, academic investigation to the openness of imaginative, sensorial and aesthetic correspondences.

In the initial phase of the research project, my attempts to understand the digital crowd led me to the field of crowd management, and from there to crowd simulations and multi-targeted tracking systems. I was especially intrigued by the image of the human body in crowd

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landscape, of voxelated sculptures, of pixelated fabric or polygon-shaped shoes, we can see these as digital media being represented on – or remediated to – real-world surfaces'. Bishop R., Gansing K., Parikka J., Wilk E. (eds.), *across & beyond: A transmediale Reader on Post-digital Practices, Concepts, and Institutions*, Berlin: Sternberg & Transmediale, 2017, p.76

simulation software, by the computationally generated visualisations of human figures designed to act within crowds.

Crowd simulation images, and especially the default characters that populate them, show something – a standardised, computational crowd subject – but they also hide something: the layers of infrastructure that facilitate the images and their mediation. The politics of that aesthetic mediation needs to be unravelled, which forces us to go beyond the "immaterial", digital image.

I identified two key terms that helped me understand how crowds are digitally governed and mediated: 'default', as a tool of rationalisation and standardisation of crowd behaviour for better management, and 'flow', as the preferred and most efficient dynamic politics of that same crowd. This research was therefore organised – both theoretical and practical – as an investigation into these two terms.

Such investigation required a mapping and a contextualisation of the postdigital crowds – both the simulated ones in gaming etc., and the "analogue" ones tracked by various surveillance systems. The first chapter of this thesis therefore maps the various computational techniques of simulation and tracking. It provides a theoretical and historical contextualisation of postdigital crowds (with references including Gustave Le Bon, Elias Canetti, Siegfried Kracauer, Alexander Galloway, Nora Khan, Lev Manovitch, Harun Farocki, Yuk Hui and Gonzalo Frasca. It explores how crowds are digitally tracked but also simulated with the help of crowd simulation software. Finally, the chapter analyses the interactive digital characters that populate computer games, so-called "NPCs" (non-player characters).

The second chapter studies default settings, the pre-programmed options we face in our smart devices and apps, and incorporates references from key contemporary theorists including Shoshana Zuboff; Marshall Mac Luhan, Adam Greenfield, Erich Fromm, Wendy Hui Kyong Chun, Gabriel Tarde, Marina Vishmidt and Tiziana Terranova.

Default settings provide users with simplified interfaces by limiting information and available choices, as data on user behaviours is being harvested. Most crowd simulation software propose default characters: standardised human figures programmed to act collectively; subjects of the crowd. Digital crowd agents programmed to avoid others and objects, so that the crowd remains in a state of continuous, dynamic flow. In the artistic components of this

project, the default character is an important figure to study, and was the central object of investigation in my solo exhibition *Default Characters* at Marabouparken Art Gallery in 2018 (which was a major presentation of this practice-based research).

The third chapter studies the notion of "flow", exploring how it provides a link between the postdigital crowd and various market and political strategies. Through readings including contributions by Siegfried Kracauer, Brian Massumi, Adam Greenfield and Ronald Purser , the chapter considers the ways in which "natural" states of flow have been rechanneled and even "hijacked" into monetised systems, instrumental in the organisation and modelling of crowds. Keeping crowds in flow enables their continuous performativity and exploitation as sources of productivity. The artistic components that correspond to this chapter explore the figure of flow through different techniques, such as immersive montage and performance. In the essay film *The Power of Flow. The Flow of Power* (2020), the viewer is invited to embark on various experiences of flow, from an imagined, original "natural state" to infrastructural flows, and to the monetised, virtual flows of online "mindfulness" platforms. In the *State of Flow* (2020), in turn, the subject of the smoothly "flowing" crowd reveals a strenuous and tense body in constant motion.

In the artistic components of this research project, I employ a combination of different mediums and methods, held together by my consistent use of the human body as a mediator, revealing the contingency and the finitude of the organic and the digital alike.

In films, installations and sculptural works I more or less explicitly draw on a number of sources and precursors: the critical documentary and essay films of Harun Farocki (such as *Serious Games* and *Parallel I-IV*); the interest in new, digital mapping techniques and 're-mediating' processes among investigative artists and collectives such as Forensic Architecture or Trevor Paglen. However, in my research project the focus remains the postdigital crowd, and the subject forms and modes of corporeal, sensible experience that correspond to it (as in *Default Character 1-2-3*) with special attention to the aesthetics performed by the digital apparatus[7]. In my performance works I draw on what Andrew Hewitt calls "social choreographies", linking that notion to score-based techniques in modern and contemporary dance and performance art. The use of scores and reenacted gestures stems from the post-modernist tradition as, for

[7] An example is the preservation of the glitches and markings made by the 3D printer on the busts of *Default Character 1-2-3*. These markings are usually polished away manually, by the human hand.

example, in the works of Yvonne Rainer and Simone Forti. I also adhere to the critical investigations into postdigital modes of embodiment and power relations in the performance works of for example Alexandra Pirici and Anne Imhof, but where their works focus on industrial/economic labour regimes and social media attitudes, my performances focus on the postdigital condition of the automated crowd subject.

In this research project I also examine how digitally formed patterns can inform us about the politics and aesthetics of postdigital governance. There seems to be an uncanny correspondence between algorithmically organised crowds performing in perfect synchronisation, and crowd representations and performances in authoritarian regimes.

This research project returns to an age-old dialectic: the dialectic of individual and mass, of activity and passivity, of emancipation and submission. It seeks to address that dialectic, and its contemporary modulations, through analyses of the terms ``default" and "flow". Furthermore, the postdigital regime in which the crowd operates – where the digital and the analogue (organic) are deeply entangled – shifts the conditions for thinking the possible agency of the postidigital crowd. An understanding of this regime is therefore crucial for any understanding of how collective behaviour will continue to evolve and what role digital crowd mapping may play in that development.

The fundamental aim of this practice-based research project is therefore to identify the conditions of collective agency, through theoretical and practical analyses of the computational tools which are used to mediate and govern today's crowds.

The intent is to make graspable and 'real' – through embodied identification – how we, as members of a potential global crowd, may understand the postdigital governance techniques that affect our gestures and behaviours, but also our senses of political agency and our perspectives for social emancipation.

Ch. 1: The Simulated Crowds

The digitisation of crowds and collective behaviour

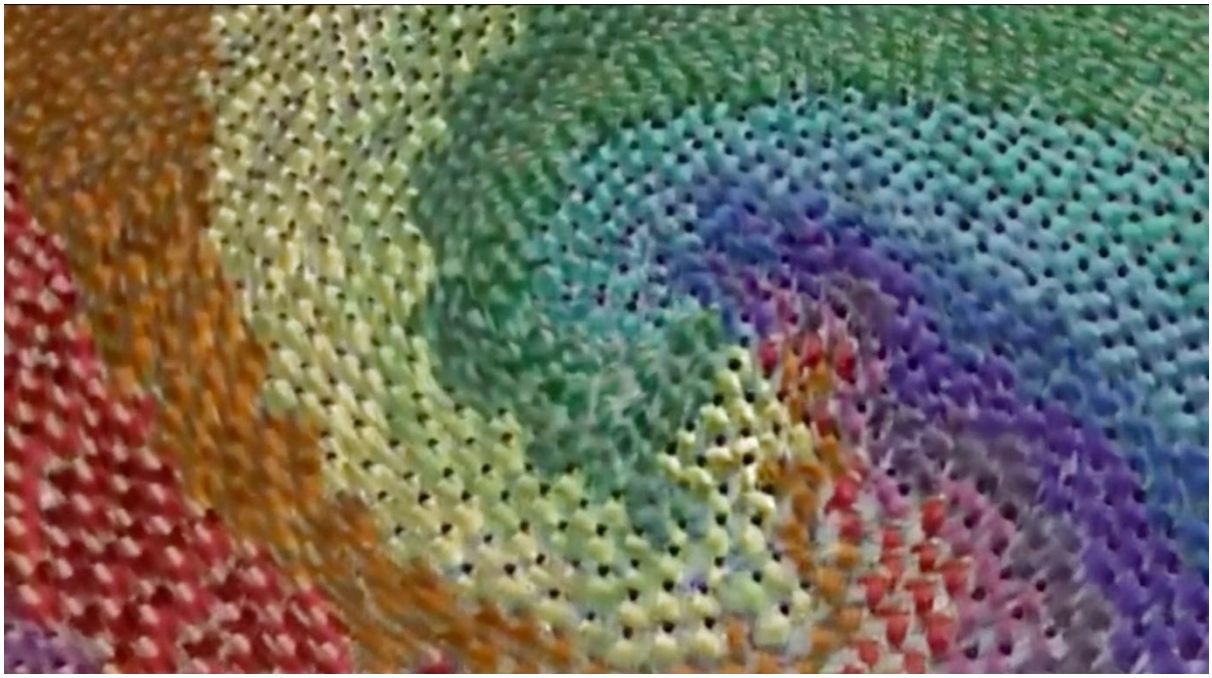

Figure 2-Still from 'Default Character' 2016.

> "You can quickly create crowds with large numbers of characters that react intelligently to each other and to their environment. In the behaviour tree is where you can make the actors do what you want."
>
> —tutorial, voice over of crowd simulation software Crowd FX

The discovery of online tutorials and showreels of crowd simulation software was crucial in the early investigative stages of this research. The aesthetics of the simulations were striking, featuring mesmerising colour co-ordinated mass choreographies with perfectly synchronised behavioural patterns. What emanated from these simulations was the deeply inhumane behaviour of the crowd in its extreme rationality, order and control of gestures. This was not only due to the digital characters' simplified features, such as the lack of a mouth or hand gestures, but most prominently in the way they behaved collectively. The co-ordination of the crowd's members was too meticulously calculated and performed. This computational representation epitomised the algorithmically organised crowd. It was an image of a digitally

programmed collective body, yet, aesthetically reminiscent of the mass parades in reverence to authoritarian regimes.

This chapter addresses the aesthetics and politics of various digital methods and tools of surveillance, control and crowd simulation. It aims to diagnose the ramifications of the employment of these computational technologies on the representation, mediation and governance of crowds and collective behaviour.

I will begin with a brief historical background on the notion of crowds, in order to then map the various tools used to digitally track, but foremost to simulate, crowds and collective behaviour, such as crowd simulation software and interactive non-player characters (NPCs) of computer games.

The crowd and the mob

'Crowds are only powerful for destruction' Lebon, 1895 [8]

Crowd behaviour has long been observed, controlled and politicised. Here I will outline some key historical references that contextualise today's postdigital crowds. I will link early crowd theory, the first crowds of the industrialised age, the emergence of computational tools and the development of globalised surveillance during WW2 and The Cold War and finally the entangled digitised and simulated crowds of today.

In an early text dedicated to crowd theory, *The Crowd: A Study of the Popular Mind* (1895), Gustave Le Bon depicts crowds, in the light of recent French uprisings, as a destructive force of chaos, a mob which needs to be controlled. Sigmund Freud, later on, confirmed Lebon´s negative aspect of the crowd in his *Group Psychology and the Analysis of the Ego* (1921) where he defined the individual as becoming a barbarian once part of a crowd[9].

[8]Le Bon, G. (1895) *The Crowd. A Study of the Popular Mind*. 2005 edn. USA: Filiquarian Publishing, LLC.p.10.

[9]'For us it would be enough to say that in a group the individual is brought under conditions which allow him to throw off the repressions of his unconscious instincts.

Le Bon argued that the individual's particular requirements are obliterated within the crowd, and in this way their distinctiveness vanishes. This perception reduces the crowd to how it has been traditionally observed by the arts and social sciences: from afar as a mass where the individual ceases to exist (noted by A. Döblin in 1929[10]). A perception which is challenged and addressed in this research.

In Europe, the general negative characterisations of the crowd as an irrational mob persisted until some re-evaluations after the First World War. For instance, during the interwar period, in Weimar Germany, under the influence of enthusiasm for revolutionary movements stemming from Russia and German social democracy, theorists including Walter Benjamin and Sirgfried Kracauer began to reconceptualise the masses and their formations in urban, everyday life.

Walter Benjamin's way of referring to the urban crowd is in clear contrast to Le Bon's and Freud´s remote and pejorative perspective of the mass as an uncontrollable force. Throughout Benjamin's oeuvre, the crowd is depicted as an assembly of singulars with agency. In *Crowds and Democracy* Stefan Jonsson states that 'Benjamin also branches off from most post-individualistic accounts of the mass, according to which the mass was made up by people lacking means to represent themselves coherently as individuals with firm identities and positions' (Jonsson, 2013, p.194).

When Stefan Jonsson refers to post-individualism it is within the context of the Weimar (interwar) period and the work of Kracauer, Brecht, Döblin and Musil who agreed that the masses negate individualism in order to promote an active and newly rational sense of the collective, as a political gambit. 'The work of negativity is for them a work of reason that discloses a layer of social life deeper than the individual' (Jonsson, 2013, p.64). They attempted through their respective practices to represent and conceptualise this aspect of the relation between the individual, the subject and the mass. This research draws from these considerations about the individual as a subject, part of a crowd and a collectivity yet with individual and collective agency– not as a destructive blind force.

Isolated, he may be a cultivated individual; in a crowd, he is a barbarian—that is, a creature acting by instinct. He possesses the spontaneity, the violence, the ferocity, and also the enthusiasm and heroism of primitive beings'.(Freud, S., *Group Psychology and the Analysis of the Ego,* 1921).

[10] 'Viewed from a certain distance, distinction vanish; from a certain distance, the individual ceases to exist.' Döblin, 1929.

Calculating the masses

Georg Simmel observed, already in the early 1900s, how the expansion of the urban landscape, with its complexified infrastructure and growing crowds, impacted the behaviours of its subjects, rendering them to insignificant atoms organised into an overwhelming and towering environment. An image of the urban crowd flowing through the city traffic and vertically organised into the capitalist symbol of the skyscraper, a hierarchical social and economic stratification. Simmel further introduces the first conceptualisation of an algorithmically organised society, where the economic system dictated the birth of a computational society where problems are solved using numbers.

> 'The modern mind has become more and more a calculating one. The calculating exactness of practical life which has resulted from a money economy corresponds to the ideal of natural science, namely that of transforming the world into an arithmetical problem and of fixing every one of its parts in a mathematical formula' Simmel, 1903.[11]

Following this line of thought, on the aesthetics of the crowd, urban life and its relation to the prevailing economic system, Kracauer, ulteriorly, used the term 'mass' in *The Mass Ornament* to describe the organisation and the configuration of the urban crowds during the Weimar period. Thus, Kracauer's 'mass ornament' introduces contingency regarding how the mass is organised and aesthetically articulated, and in which economic-political systems it operates.

> 'The mass ornament is the aesthetic reflex of the rationality to which the prevailing economic system aspires'. Kracauer, 1927.[12]

Kracauer defines the politics of the masses principally by how the crowd operates in the current capitalist economy, and how that system shapes its behaviour. He establishes a direct link between the behaviour of the urban masses with that of the spiralling capitalist process.[13] This

[11] Simmel, G. (1903) *The Metropolis and Mental Life*. Internet: Blackwell publishing. available at https://germanhistorydocs.ghi-dc.org/sub_document.cfm?document_id=747
[12] Kracauer, S. (1927) 'The Mass Ornament' [June 1927]. trans. T.Y. Levin, in *The Mass Ornament: Weimar Essays*. ed. 1995, Cambridge/London: Harvard University Press. p.79
[13] To be noted here is that today's rise of far-right political currents raises similarities and links to the interwar period making it a period in time relevant not only from a historical perspective but how the masses were organised and the influence of power structures and strategies on collective behaviour.

interrelation was accelerated by the development of new technologies during WW2 and has been further intensified, in a postdigital era, where computational technologies are instrumental in the acceleration of today's globalised society.

> 'Contemporary conceptions of globalisation are inconceivable without the spatial compressions and conceptual expansions inaugurated by World War II and aggressively pursued during the Cold War.
> The construction of the global found within the concept of globalisation emerges from the networks required for real-time surveillance to track and target all of the world at the same time'.[14]
> John Beck and Ryan Bishop, 2016

After WW2 and the emergence of computational governance

Right before the war, in 1936, Alan Turing had created the concept of the first modern computer, known as the Universal Turing Machine, which was also the first storing program (which leads us to the meta and big data as we know it today) introducing computational power.

There was a crucial and pivotal moment with the arrival of WW2 where the surge in military development and strategy (such as missile targeting and surveillance) brought about the systematised and automated techniques and tools which are at the root of the digital computational techniques we have today such as the GPS, chips, the internet and mobile tech devices. The first digital computers, such as the ENIAC (Electronic Numerical Integrator and Computer) also emerged at that time (1945). Hence, by the 1940s, alongside the technological developments made during the war and industrialism being completely integrated into everyday life, life and the urban system had become a mathematical system enforcing a sense of automation of collective behaviours (Erich Fromm, 1941).

One of the crucial technologies to emerge during this time was GPS satellites which, from then, and increasingly so during The Cold War, made possible a total surveillance of the whole earth.

[14] Beck, J., and Bishop, R., (eds). *Cold War Legacies: Systems, Theory, Aesthetics*, Edinburgh University Press, 2016, p.10

This was the emergence of a global surveillance system which put every subject within its purview.

In the 1950s, a shift from a mechanical and analogue electronic society to a digital age, imposed a new aesthetic defined by computational technologies, leading the crowd into new operational modes of surveillance and control. Alongside the development of cybernetics – coined by Norbert Wiener in 1947 which proposed the concept of the feedback and adaptive systems (which later brought about the concept of optimisation and AI/machine learning) the crowd entered a new digitally systematised and governed state.

Another pivotal moment was in 1995, where the emergence of the internet for all[15] paved the way for which has developed recently into an intensely connected, online existence with the 'Internet of Things'[16] and the 'Quantification of the Self'. The surveillance, tracking and data harvesting of the crowd was now possible all the way from the satellites in space to right inside the human body.

In the context of the postdigital, wherein computational techniques and online existence have merged time and scale, the crowd operates in an algorithmically-dictated world, a networked society of hypervisibility and 'surveillance capitalism',[17] as postdigital 'dividuals'.[18] There is a postdigital space of hypervisibility available through massive information flows, but also a world

[15] 'On a rather dubious mission to mark 1995 as the most influential year in recent times, in 2015 the author W. Joseph Campbell launched his book 1995: *The Year the Future Began*, citing five "epochal" events. These were the mainstreaming of the internet (referring to the popularization of the www,with the browser Netscape joining the stock market and the launch of Microsoft's multimedia operating system, Windows95).' From Gansing, Kristoffer. '1995: The Year the Future Began, or Multimedia as the Vanishing Point of the Internet' in *transmediale* 22.05.2017 found at https://archive.transmediale.de/content/1995-the-year-the-future-began-or-multimedia-as-the-vanishing-point-of-the-net

[16] The Internet of Things IOT first emerged as a concept in 1985 by Peter T. Lewis but was later coined in 1999 by Kevin Ashton. The IOT as described by Adam Greenfield in *Radical Technologies*: 'A weave of networked perception wraps every space, every place, everything and everybody on earth. The technologist Mike Kuniavsky, a pioneer and early proponent of this vision, characterises it as a state of being in which "computation and data communication (are) embedded in, and distributed through our entire environment. I prefer to see it for what it is, the colonization of everyday life by information processing'. Greenfield, Adam. *Radical Technologie*s, London, Verso, 2017, p.32

[17] Zuboff.S. *The Age of Surveillance Capitalism*, 2018.

[18] 'dividuals' coined by Gilles Deleuze is when a controlled society masses have become data and the individuals composing that mass are lacking autonomy. He describes it as: 'We no longer find ourselves dealing with the mass/individual pair. Individuals have become "dividuals", and masses, samples, data, markets, or "banks"'. Deleuze, G. *Postscript on the Societies of Control*, 1992. P. 5

of dissimulation and invisibility of the systemic infrastructures and protocols that govern the crowd.

With the emergence of an established computationally operated environment, several theorists support the idea of an economic-techno-based society as in *Rhythmanalysis* (1991) where Henri Lefebvre[19] states that our bodies and everyday life has been colonised by media technology and consumerism.

Moreover, just as everyday life has been permeated by capitalism, so has its location: social space and what Lefebvre calls 'constrained time' (travelling time, bureaucratic time). Jodi Dean has posited an extension of the idea of the public sphere, as theorised by Habermas, into the present age. It is a potential technological realm of democratic values. It comes under pressure in its present format of the internet, which seems to be adapted extensively to capitalist values. More recently Shoshana Zuboff has addressed the link between capitalism and the specific deployment of new digital technologies in her book *Surveillance Capitalism* (2018).

Surveillance and tracking (data harvesting) technologies are operated by only a few manufacturers and corporations which dominate the market,[20] or in some cases by governments. If, as Kracauer stated, the crowd is a mimetic reflex conditioned by the prevalent mode of production (an observation which links to the postdigital as noted by Barry and Dieter[21]), then the internet and today's computational technologies are used as tools to subsume that crowd into today's capitalist system. This overrides any initial hope for the internet as a sharing platform. However, the potential sharing (peer-to-peer) power on/of the internet as an alternative to monopolistic economic powers is not to be underestimated within

[19] Lefebvre, H. *Rhythmanalysis: Space, Time and Everyday Life,* 2004.

[20] Such as Microsoft, Amazon, Apple, Facebook and Google

[21] 'For Kracauer, the ornamental patterns produced by groups of dancers, for example, are the aesthetic reflex of the rationality to which the prevailing economic system aspires. He calls this the 'mass ornament', which is not simply a superstructural reflection of the prevailing mode of production. Rather, Kracauer reads the geometry of contemporary patterns and ordering as an ambivalent historico-philosophical allegory, insisting that they are also a mise-en-scene of disenchantment. Thus, the mass ornament manifests progressive potential as the representation of a new type of collectivity, organized not according to bonds of a community but as a social mass of functionally linked individuals. The postdigital constellation similarly resembles aerial photography of landscapes and cities, in that it does not emerge out of the interior of the given conditions, but, rather, appears above them – granting a distant reading of culture, society and everyday life. In the midst of a world which has become blurred and ungraspable, the postdigital constellation becomes a primary element, an object for a cultural analytics that provides connection and a sense of cohesion in a fragmentary digital experience. Berry, D.M, and Dieter, M. (eds) (2015) *Postdigital Aesthetics: Art, Computation and Design*, London: Palgrave MacMillan, p.51

the hands of future generations as a reaction to 'the new normal' of anticipated post-apocalyptic environments of unfolding crisis, climate change and pandemics where there is an urgency for solidarity above profit.

The atomised crowd

Billions of people circulate in urban, supervised infrastructures while simultaneously operating in the virtual realm when surfing on their smart devices. Online they are atomised and fragmented, a disembodied yet connected crowds are 'alone together' as Sherry Turkle describes in her best seller *Alone Together: Why We Expect More from Technology and Less from Each Other.*[22] A phenomenon which is concurrently translated into the urban landscape as when people are online, absorbed into their mobile devices they become distanced and dissociated from their surroundings and other people. This behaviour fragments the physical crowd into separate atomised entities even while sharing space. This phenomenon can be aligned with the particle logic, echoing the technologies used to model and simulate crowd behaviour. This particle logic of fragmentation and atomisation enables control of every single member of the crowd turning it into a detailed, particle operated mass. Hence, a digitally programmed crowd of users and consumers.

> 'When operated by computational and online logics for consumerist purposes the crowd turns into atomized particles easier to control. When the users are considered as social atoms which can then be superimposed onto a technological network, the spontaneity and innovation within the collective is given to control of the networks, which is mainly driven by intensive marketing and consumerism aimed at individuals'. Hui, 2011.[23]

Intensified digitisation has gained new technological forms via the 'quantification of the self' and new social and communication platforms with individualised scripted spaces. These personalised environments create a social atomisation which has a divisive and fragmented effect on the crowd. At the same time the daily use of these platforms and linked digital

[22] Turkle, S., *Alone Together: Why We Expect More from Technology and Less from Each Other,* Basic books, 2011.
[23] Hui, Y., 'Collective *Individuation*: a New Theoretical Foundation for Social Networks', CCCBLab, 2011.

devices inscribes new gestural habits and collective behaviours discreetly implemented through time. This atomisation, reinforced by personalised (customised for consumerist purposes) scripted spaces and social media bubbles and filters, make way for an ever heightened individualised and compartmentalised society of mass operated yet separate bodies in a process of gestural transmutation.

Tracking bodies

> 'Now these flows (of information transpiring from smart devices etc) can be traced, at least in principle, and plotted in space and time. All this is possible because of the vast array of data-collecting devices that have been seeded throughout the quotidian environment, the barely visible network that binds them, and the interface devices just about everyone moving through the city carries on their person'.[24] Greenfield, 2017.

Human tracking devices are used to track people in crowds and urban settings. The tracking is done both through devices such as mobile phones but also via external surveillance systems. These surveillance systems are operated both by overarching GPS satellites as well as local cameras where the optical lens studies the image of the crowd. The graphic overlay which defines the tracking of the members of the crowd in the multi-target tracking system is usually in the form of coloured boxes, dots or pixelated segments.[25] These tracking systems collect data on collective behaviour which can then be used to model and predict crowd behaviour, but also to programme behavioural patterns for crowd simulations.

[24] Greenfield, A.,. *Radical Technologie*s, London, Verso, 2017, p.2

[25] The images of the mentioned optical tracking systems have been deployed both in the films *Default Character* (2016) as well as *Di-Simulated Crowds* (2018) as well as in the collages *Invisible Infrastructures* (2018). These collages include details of the technique known as Optical flow which uses the particle logic, appearing as a pointilliste feature on the image.

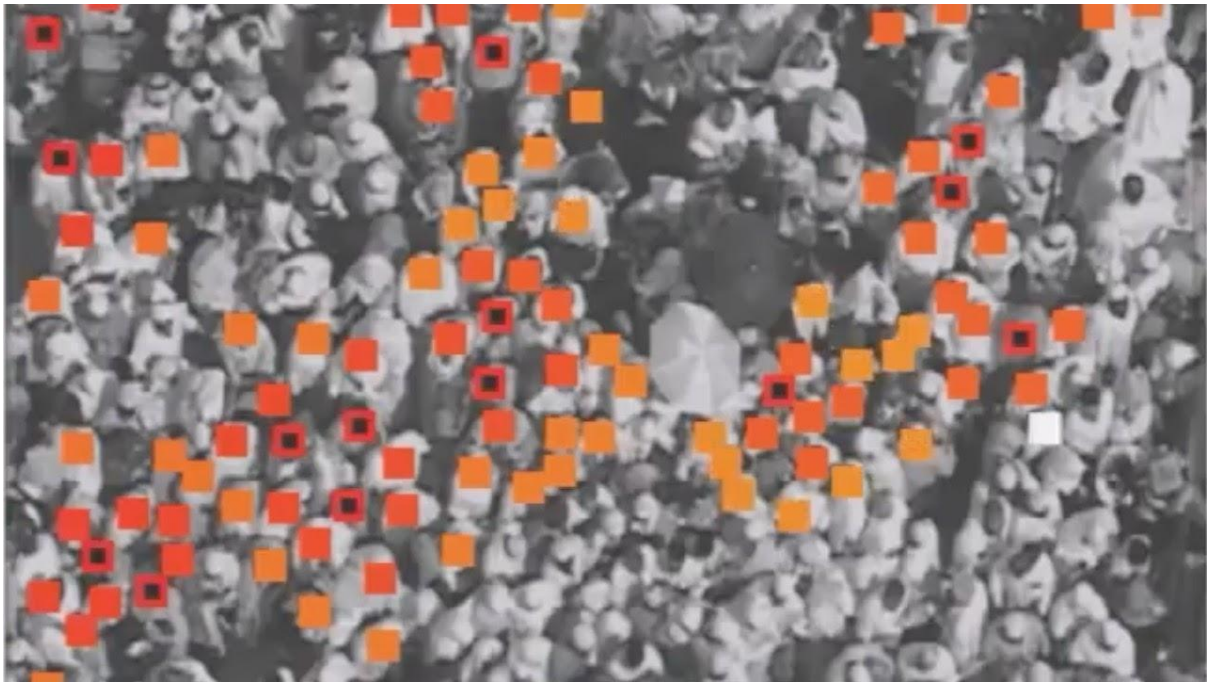

Figure 3- Still from Default Character (2016) featuring multi-target tracking surveillance.

In the above image the people that stand out, in any way, from the crowd because of their behaviour are flagged by the multi-target tracking system.[26] This image demonstrates, through the way the coloured squares are organising the crowd, why a particle logic can be applied on the management of crowds.

When studying the aesthetics of multi-target tracking systems (as seen in the practice-based projects *Default Character* (2016) and *Di-Simulated Crowds* (2018) the algorithmically-programmed graphic overlays apply an optical filter depicting an intent to organise the crowd by schematising and rationalising it, favouring an homogenous appearance and collective behaviour. The calculated geometric shapes are the projection or prediction of the rational algorithmic organisation of that crowd favouring so called 'normal' behaviour. What defines abnormal behaviour? Does the flagging of difference intend to homogenise the crowd's behaviour?

Furthermore, via the 'quantification of the self' we willingly upload data about our bodies and physical performances via apps on our smart devices. The accelerometer in our smart devices

[26] The video still features a detail from a video presented in the lecture 'Multi-Object Tracking/crowd tracking and Group Action Recognition' by Prof. Mubarak Shah, University of Central Florida, Committee on Applied and Theoretical Statistics, May 16th, 2014. Found at https://vimeo.com/showcase/2908324/video/97544365

tracks our movement in space. A biometric device gathers data about our sleep and movement during the night. Devices such as smartwatches can gather data on our blood oxygenation, heart rate and body temperature. Apple was recently granted a patent for wireless earbuds with health sensors that are capable of tracking the user's heart rate and body temperature. Heart rate, for instance, can not only inform on the physical state of a person at a given time in a given space, but also their psychological state.

This is all part of today's self-tracking phenomenon. According to Gary Wolf (who proposed the notion of the quantified self), our body (our 'self') is our operation centre (our consciousness, our moral compass) and, to act more effectively, we have to know ourselves better. This self-knowledge, often associated with the notion of self-empowerment, is a selling point which invites people to share their data while believing they will optimise themselves: an optimisation whose ultimate intent is to be fit for the demands of society. Hence, we willingly give out our detailed personal data in exchange for the belief in better 'self-knowledge' or rather 'self-control'. With a promise of greater knowledge about our individual health, people have learnt to trust self-scanning and tracking devices, which have also become supposedly scientific tools ensuring a new 'self-knowledge' through numbers which is sold as a way for 'self-empowerment'.[27] Here again, these self-oriented scripted environments are used to lead the user to believe they are in control of their personal environment, but in actuality are trading their data.

An intensification of these tendencies of corporal tracking creates an ever more detailed world of information available for predictive models and simulation of human bodies and behaviour as well as for crowd management purposes. A modulation of the crowd, which when used for an interactive simulation, is not an extension of the real as much as it is a simulation of the simulation in the now as real.

Simulating Crowds and collective behaviour

In today's postdigital era, reality and the digitally simulated 'realities' have merged through the constant online connection between our bodies/minds and the computational virtual world: a

[27] "The renewed pursuit of health aided by personal devices and mobile technologies is giving way to new forms of commercial exploitation, as well as new forms of discrimination against those whose bodies and habits are found wanting." Tiso, Giovanni, 'Self-knowledge through numbers' in *New Humanist*, 15th April 2019.

symbiotic relationship enabled by the invisible computational infrastructures that operate (control) and surround us.

In *Crowds and Powe*r Canetti describes a simulation as a transitional stage between imitation and transformation where 'the intention is to conceal what one is rather than to pretend to be what one is not'[28] (Canetti, 1960). Canetti sees the terms 'simulation' and 'dissimulation' as inseparable. There is an interesting dependency between these two terms if they are thought through the lens of today´s digital entanglement where a crowd simulation (pretending a crowd) is a product of the dissimulated (concealed) systemic harvesting of biometric and behavioural data.

It can be said that to simulate is to pretend with the intention to hide real intentions. Yet to digitally simulate is *not* to pretend, as it relies on original truth to be believable and is therefore partly included in the simulation, as Baudrillard examined in his *Simulacra and Simulations*.[29] The incorporation of original truth is still decisive in how digital simulations are thought. It is the believability of the simulation which matters when the simulation is to imagine the future, the real, replacing the idea of the real (Baudrillard, 1994). Baudrillard states:

> 'pretending, or dissimulating, leaves the principle of reality intact: the difference is always clear, it is simply masked, whereas simulation threatens the difference between the "true" and the "false, "the real" and the "imaginary"'. Baudrillard, 1994.

To simulate is a fictional act. A dramatised or scripted performance alluding to a real event. For example, how we try to visualise our performance in an upcoming competition. As such, Nora Khan described her perception of simulation as follows: 'simulations are the real world's activations of data to calculate and predict future actions' (Khan, 2019). She adds that 'simulations are how we think of the world constantly and inherently virtually'[30]. A thought which brings us to the computational simulations as they are what first comes to mind when we think of the notion of simulation in today's postdigital era. These simulations are not only

[28] Canetti, E., *Crowds and Power,* 1960.
[29] Baudrillard,. G, *Simulacra and Simulation*, University of Michigan press ed. 1994 (original 1981). Baudrillard Simulacra and Simulation belongs to an era before the post digital which makes it obsolete from many perspectives, yet it needs to be addressed as it one of the few committed writings which addresses the notion of simulation.
[30] Khan, N., in an online lecture as related to her upcoming book *The Artificial and the Real*, Art Metropole, Toronto, [forthcoming]

representations, but are intended to predict acts and behaviours, as in the simulation of crowds.

> 'For the first time in history, humanity has found in the computer the natural medium for modeling reality and fiction. ... To take the analogy further, simulation is the form of the future. It does not deal with what happened or is happening, but with what may happen. Unlike narrative and drama, its essence lays on a basic assumption: change is possible'.[31] Frasca, 2003.

The aforementioned conceptualisations of the idea of simulation concur that a simulation is foremost a human interpretation of the real through the digital. The new computational processes and tools using algorithmic organisations rationalise that interpretation, which in turn is used for more complex strategic and predictable models of organisation. The predictive model of a simulation, a prognosis based on real data, creates the ability to 'foresee' the future. Hence, the models it produces can potentially be not only those of control, but also of possibility. However, the change Frasca is referring to is in the hands of those who have the data, access and control over the technology producing the simulations. Even if AI and machine learning can potentially develop independently, using their own autonomous intelligence or smartness, they are still originally fed with human data and programmed by human logic for human purposes.

Computational models, simulating reality, aim not to conceal but to imitate, with the intention to predict and model that same reality: to control the future. The intent is to optimise, be it an object, environment, or character. Hence the simulation's aim is to offer an updated version of the existing.

> When we use computers to simulate some process in the real world—…—our concern is to correctly model the necessary features of this process or system. We want to be able to test how our model would behave in different conditions with different data'.[32] Manovich, 2013.

[31] Frasca, G., "Simulation versus Narrative: Introduction to Ludology" Ch. 10 in *The Video Game Theory Reader* eds. M. J. P. Wolf and B. Perron, London: Routledge, 2003 p.1
[32] Manovich L. (2013) *Software Takes Command: Extending the Language of New Media*, London: Bloomsbury Academic.

However, the simulation models of digitally representing human crowds, still have limited AI and characteristics. This phenomenon is not only dependent on computational capacity or the handling of a vast amount of data or entities but also has a strategic purpose within the given simulated narrative. The goal is to keep the crowd homogenous, rationalised and simplified – easier to control. In, for example a film or a computer game, digitally simulated crowds are designed to appear and act as part of a background, and not intervene or disturb the main narrative which is played out in front of the camera.

The digital simulation of multiple human bodies and collective behaviour is first of all to think and organise the crowd mathematically, using algorithms. A digital organisation whose inherent purpose is to rationalise human behaviour. Humans are complex, both rational and irrational, a contradiction in itself which cannot be algorithmically organised and simulated yet.[33]

Crowd simulation software

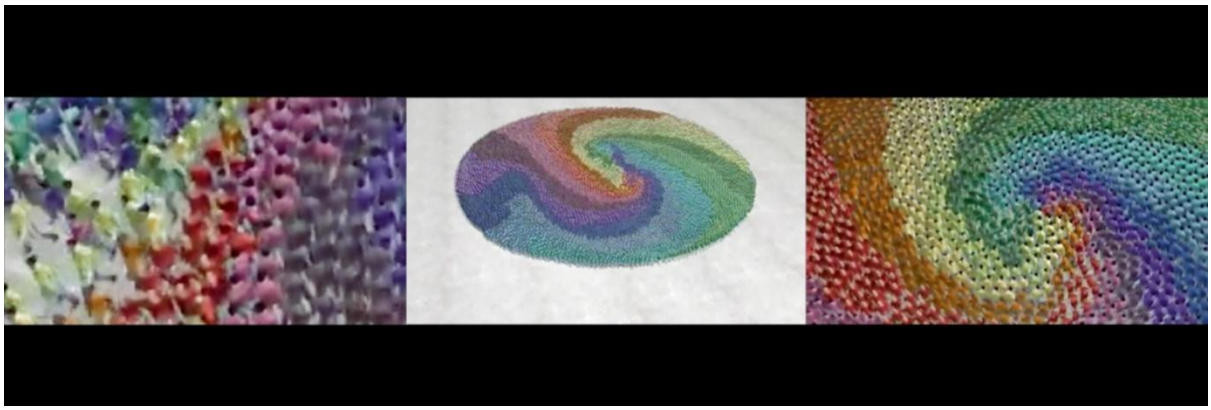

Figure 4 - Still from Di-Simulated Crowds (2018).

> "This mass choreography is flawless in its coordination. It appears as a puddle of mercury and petrol shimmering in rainbow colours. A perfect swarm avoiding any collision." — voiceover and still from *Default Character* (2016).

[33] With the development of new technologies and an augmented capacity of processing data may create more complex and intelligent simulations. On the other hand we are still in a reality where for example crowd safety experts cannot use digital simulation for predictive purposes of for ex. evacuations systems due to the human complex nature of crowds.

The videos of online tutorials and showreels of crowd simulation, uploaded by the manufacturers which I encountered early on, moved the research towards digital simulations of crowds as both the beholder and the material for analysis of the correlation between the aesthetics and politics of the digital crowds. Crowd simulations are used in crowd management, populating a digital urban landscape or can be used to illustrate massive crowds or epic battle scenes in Hollywood films (a phenomenon which emerged when extras became too expensive) or to produce Non-Player Characters, the interactive virtual crowd in computer games. Crowd simulation is a digital representation of a crowd composed of mathematically developed digital agents programmed intelligently, using simple AI and multi-agent systems[34] to act collectively according to each other and the given environment. It is a computer engineered 3D image or graphic overlay simulating the crowd's behaviour, gestures and characteristics.

These simulations propose an embodied visualisation, a 3D image, of a crowd fully programmed and thought by a computational logic/system. Hence, the visualisations offered by these simulation software put forward a direct link, a metaphor for how the organic crowd is modelled and programmed through new computational models.

> 'all disciplines which deal with contemporary society and culture—architecture, design, art criticism, sociology, political science, art history, media studies, science and technology studies, and all others—need to account for the role of software and its effects in whatever subjects they investigate'. Manovich, 2011

The showreels and tutorials of the crowd simulation software not only included an image of an algorithmic body whose purpose is to act collectively, but also explained how these simulations could be used, by who and for what purpose.

[34] A multi-agent simulation framework is a computational methodology that allows the building of an artificial environment populated with autonomous agents which are capable of interacting with each other. The crowd simulation engine is the core module of the multi-agent system. Each agent is assigned with an 'individual behaviour model' (based on the data generated from the population generator), a computer system capable of autonomous action in a given environment in order to achieve its delegated goals. The MAS has been widely accepted as a promising approach to modelling complex emergent phenomena. A computational methodology that allows building an artificial environment populated with autonomous agents that are capable of interacting with each other, the MAS is particularly suitable for simulating individual human cognitive processes and behaviours in order to explore emergent macro-phenomena such as social or collective behaviours.

Unlike the image of the organic crowds we are used to see – appearing as a myriad of colours and varying dynamics – this specific crowd acted as a colour co-ordinated unidirectional swarm: crowd as swarming flock. However, humans do not swarm. The swarming or flock behaviour (Boids) seen in crowd simulations is a rationale which aligns the intelligence and complexity of the crowd member with that of lambs, bird or fish.[35] And consequently regards them as equally reduced in capacity.

In these images the crowd is considered a homogenous mass where individual agency is lost. Only authoritarian regimes organise the masses in this way so as to display their supremacy and control over the population.

However, that is depicted not only in the aesthetics and imagery of the meticulously organised crowds within authoritative political structures. It is also the vocabulary used in the software to program the crowd, as demonstrated in the related tutorials, such as "they are all available to us", "in the behaviour tree you can make them do what you want" (see films *Default Character*, 2016, and *Di-simulated Crowds*, 2018). Within the context of the software the words and directives used to animate the non-human crowd are understandable; however if the same vocabulary was used on real people, it would become a tool for authoritarian control.

Simulating crowds offers the advantage of being cost-effective as well as allowing for total control of each simulated character or agent. Crowd simulation software is constantly evolving and aims to develop agents with intelligent behaviours; however they are nonetheless limited as they are currently based on low AI. There are also several crowd simulation softwares where the crowd is only portrayed by graphic shapes such as dots and arrows (showing direction of movement). These are called entity based models, and are mainly used for crowd safety and management. These crowd simulations are simplified models of crowd behavioural/movement predictions proposing a crowd as a homogenous entity handled as mass. The aesthetics and characteristics of the agents are discarded in favour of flows and dynamics.

[35] Boids flocking algorithm: In 1986 Craig Reynolds made a computer model of co-ordinated animal motion such as bird flocks and fish schools. It was based on three dimensional computational geometry of the sort normally used in computer animation or computer aided design. He called the generic simulated flocking creatures boids. The basic flocking model consists of three simple steering behaviours which describe how an individual boid manoeuvres, based on the positions and velocities of its nearby flockmates.

The main feature seems to be, when programming a crowd's behaviour, enabling a smooth operational flow of collective movements. The characters must avoid obstacles and each other while moving in a coordinated manner; the crowd needs to be moving smoothly without disruption to be efficient within the given system (necessary only in crowd safety measures). The same is true for the crowds in films – wherein if the crowd appears as one moving entity in the background it is less likely to interfere with the principal focus of the film, or the narrative of the game. Hence the crowd as a smooth flowing entity is the principal dynamic characteristic of the simulated crowd.

The simulated crowd agent

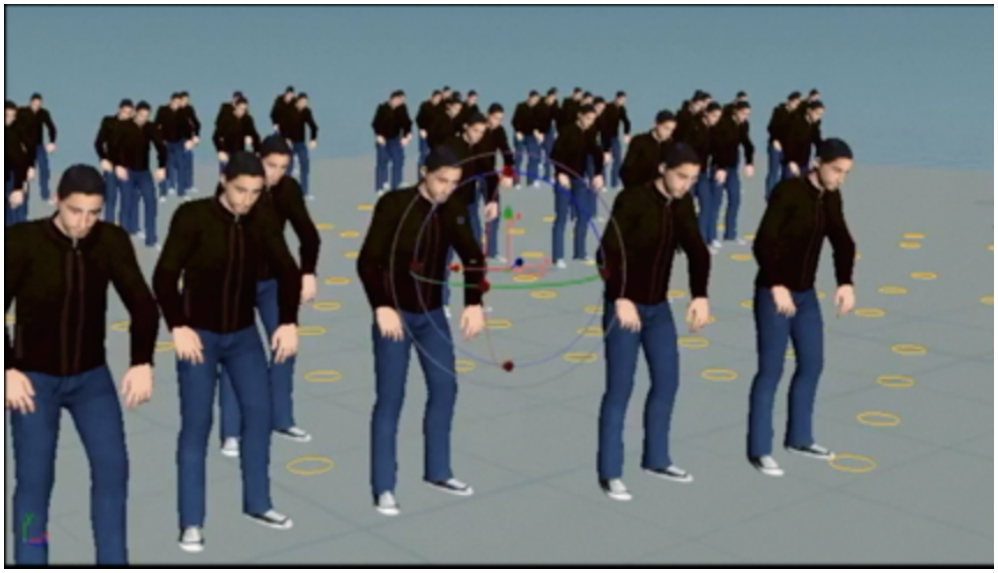

Figure 5 - Still from Di-Simulated Crowds (2018).

Most crowd simulation software (CS) such as Crowd FX, Goalem, Houdini and Massive offers the possibility of creating crowds from prefabricated default characters. The customisation of the agents is limited and offers a small variation of skin and hair colour, clothing, mapping colours and patterns as well as a smaller range of hairdos and hats. Some software has a catalogue of a variety of humans to choose from. Still the features of the faces are all the same and the default agent (sometimes called actor) is predominantly a white male. The fact that the standard option is a white male character is significant within the perspective of the identity of the whole crowd when using default options (this will be addressed in the next chapter on

default settings). In the software's 'behaviour tree' you can programme how the characters will act. The behaviour tree or library, which defines the dynamic options of the crowd agents, can take various forms depending on the software. However, most often both the AI intelligence of character modelling and machine learning refers back to neurobiology where our internal organic system is used as a reference for constructing and developing the AI in virtual agents (as well as in AI architecture).

The agents are programmed to move from A to B using the logic of the software. The agents act according to the grammar of 'and' or 'or', 'or' or 'or'[36], and by avoiding each other and objects. The software uses trigger and target areas to programme the crowd behaviour and velocity. A trigger area can, for example, slow down or accelerate the crowd's movement, from walking to running. The target areas are the goals towards which the crowd is moving.

There is a plan (maybe already in motion) to make agents with postures simulating happy or sad and with a developed emotional intelligence (EI). This EI could enable a contagion effect, where the emotional state of one agent can be communicated to another. The interest here is to understand how a contagion effect, as theorised by Tarde, and addressed below, can impact the prediction of how the crowd will operate when in an emergency where it needs to evacuate a space rapidly and safely. Here an interesting aspect is that in the modelling and predictive surveillance of crowds, by companies such as Google, the intention is to model not only (consumer) behaviour but what and how we communicate with others, forwarding ideas and intentions which follow the logic of contagion. Hence the gestural and choreographic portrayal of the effect of contagion within the programmable crowd of the crowd simulations (CS) gives a visual and gestural representation of that same chain effect which is used to control real collective behaviours.

What are the qualities of this simulated crowd? One key issue is that the crowd agents of the CS do not talk. They are mute and usually have no 3D modelled mouth. Hence body language/choreography is key for the overall aesthetic believability of the response of the crowd and to see how the contagion is propagating.

In crowd simulation software, such as Goalem, Houdini, Massive, Miarmy and Crowd FX, which have been studied in this research, there is not, yet, a contagion effect option. Hence, it has

[36] Hence the title of the performance *And or Or* (2018).

not been possible to investigate in the practice of this research but only speculated upon in relation to the logical development of the software.

The simulated crowd, for sequence based use (films), is made of mute puppets mimicking human behaviour. In contrast, the interactive crowds of the computer games talk – but the conversation and language catalogue is minimal, basically only used to re-orient the player into the narrative of the game. The intent is to direct the user towards a given path following the flow of the narrative of the given game to be able to better control and monitor the unfolding of the game and player.

The politics of crowd simulations

When creating a crowd in crowd simulation (CS) software, the user has full control over the crowd's constituents and behaviour and therefore defines the identity and politics of that crowd. As the crowd is inherently political, an image of a crowd contains a political narrative. The characters in the crowd simulation software have limited capacity and behavioural vocabulary. The CS is made of nearly identical agents with the same gestural catalogue and body language. Hence, the CS produces a rationalised and homogenised crowd which recalls an autocratic aesthetic. It is important to remember here that many crowd safety experts (such as Keith G. Still) stress that computational crowd simulations are not reliable for safety simulated measures as they cannot foresee human action due to the complexity of human behaviour. Yet, if in the future the handling of data harvested from tracking systems, the predictive models and simulations will be used to complexify the AI of the agents which are used to create simulations for crowd management and safety. The rapid development in AI and machine learning will also integrate the programming of crowds for predictive purposes which will modify the aesthetics and politics of those crowds. Alongside more (emotional and artificial) intelligent agent based models[37], detailed aesthetics, a wider catalogue of characters

[37] An agent-based model (ABM) is a class of computational models for simulating the actions and interactions of autonomous agents (both individual or collective entities such as organisations or groups) with a view to assessing their effects on the system as a whole. Characterised by autonomous, interacting individuals, each agent of a crowd in this approach is given a degree of intelligence; they can react to each situation on their own based on a set of decision rules. Information used to decide on an action is obtained locally from the agent's surroundings. Over the years, these models have grown in size and complexity. Current ABMs can simulate thousands of individuals in realistic environments, and with highly detailed internal physiology, perception and ability to process the perceptions and make

and with the development of interactive simulations we progressively enter an even more hyper-simulated era with more intelligent modes of control.

Returning to the aforementioned authoritarian politics inscribed within the aesthetics of crowd simulation imagery, presented by the software, we also see an authoritarian approach in the vocabulary used to program the digital agents. The combination of this vocabulary with the developments of a hyper-simulated future, is a matter of ethical concern within the normative standards of these software.

The interactive simulated crowds of Non-Player Characters

Figure 6 - Still from Assassin's Creed (Ubisoft game) featuring NPC's.

decisions based on those and their internal states. The implementation of decision-making in ABMs ranges from fairly simple to highly complex; the process of an individual deciding on an action can occur through the use of logical and simple (if-then) rules to more sophisticated neural networks and genetic algorithms.
Decision-Making in Agent-Based Modeling: A Current Review and Future Prospectus
Donald L. DeAngelis and Stephanie G. Diaz
1U. S. Geological Survey, Wetland and Aquatic Research Center, Gainesville, FL, United States
2Department of Biology, University of Miami, Coral Gables, FL, United States, 2019

Through the TECHNE NPIF award, I formed a partnership with the gaming company Ubisoft. At Ubisoft, with the mentorship from CEO (of the Studio) Patrick Bach, I have been in dialogue with programmers, animators and AI specialists for about two years; resulting in engaging and fruitful discussions about the computing and programming possibilities of simulated interactive crowds populating games today, and ground-breaking AI technologies more generally.[38] In computer games, the avatar is the projected real human, the player as a digital puppet, a so-called third-person player. The player can also enter the game as a camera or camera with a tool she/he then becomes a first-person player. Then there is the NPC, the non-player character: the digitally, wholly computed/programmed agent that the player can interact with. The NPC is generally humanoid in appearance (depending on the game) and with human behaviour and characteristics. When creating a game the programmer creates the characters while the modeller animates it.

The smallest denominator in creating an interactive AI agent in the gameworld, avatar or NPC is the triangle. While a photograph is made of pixels: the virtual agent is made of triangles. The amount of triangles roughly defines how detailed the character can be.

Ubisoft has several default characters compared to the sequence based CS softwares: a man, a woman and a child. The skeleton, however, is androgynous, a mix between the two sexes so that it can be used for maximum utility of agent productions.

The avatar (3rd person player) and the NPC stem from the same skeleton. Then, according to situations and how the camera is operating the game, the characters are developed differently. The avatar (which is the main character of the game) is more detailed and customisable while the NPC is less so; and, variably so, depending on how the camera (from the player, avatar) is operating the game. For example, an NPC can be more developed from one angle than another, depending on where the camera is seeing it.

[38] Unfortunately no practice based projects were able to emanate from this partnership due to the extra time and extensive costs that that would involve for the company and me.

As the computer game modellers say: you only work on what you see. In a multiplayer game there are of course a multitude of cameras.[39] Yet every player operates the game from his own camera. In all cases the camera is the link between the human and the virtual world[40].

The symbiotic interaction between the simulated and physical crowds

The future will encompass, to a much larger extent than today, an interactive simulated world and everyday life, both virtually and physically, and in combination[41]. Currently, the agents populating the simulated virtual world, as in computer games, need to be smart and able to interact with not only other agents, but also with human users and their virtual characters (avatars).

The politics of the interactive simulated crowd differ from the time sequenced crowd in the crowd simulations used for film, hence why this research turned to computer games: they provide the most realistic simulated interactive worlds.

> Games are just a particular way of structuring simulation, just like narrative is a form of structuring representation.[42] Frasca, 2003.

In the complete simulation the game offers, there are two interacting crowds: the player acting through his avatar and the digitally produced crowd, the NPCs. As in the sequenced-based CS, the NPCs in the computer games have limited capacities and features, yet their interactive nature requires more sophisticated programming and higher applied intelligence.

How do we understand the difference between the simulated body of the avatar in comparison with the simulated body of the NPC?

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[39] *Cameras in video games: Comparing play in Counter-Strike and the Doctor Who Adventures*. Eric Laurier (Edinburgh University) Stuart Reeves (University of Nottingham), https://ericlaurier.co.uk/resources/Writings/Laurier-2012-Cameras-in-video-games-comparing-play-in-Counter--Strike-and-the-Doctor-Who-Adventures.pdf, 2012.

[40] The role of the camera, the human as camera, and the dichotomy between the visible and invisible, is of great importance and is acknowledged here – unfortunately it would be too vast a subject to be addressed within this research at the present time.

[41] After the Viva and before this revision Facebook founder Mark Zuckerberg had the time to launch Metaverse/Meta which is heading this way.

[42] Frasca, G., "Simulation versus Narrative: Introduction to Ludology" Ch. 10 in *The Video Game Theory Reader* eds. M. J. P. Wolf and B. Perron, London: Routledge, 2003 p.1

The avatar is the projected human body translated and operated by hand from the keyboard or joystick. The avatar's choreography is limited because it is guided by the gestures of the hand on the joystick, then translated into the virtual body of the avatar – so-called eye-hand-control. The choreography of the avatar becomes restricted with a little support from the game, giving it a few extra moves, which expands the body within the virtual world.

The NPC, on the other hand, is not human-operated but a fully computer-generated bot, an intelligently programmed autonomous entity operating in the virtual realm. Programmed using AI, these NPCs have an unlimited choreographic range of gestures and behaviours in line with the virtual realm they are operating in. NPCs are generally operating according to the player, accompanying and assisting him or her[43]. Some games allow several players at once and hence the NPCs which assist the players multiply and populate the game not only according to one player but several proposing a more complex NPC/digital crowd within the space of the game. However, as a user/player you only understand the game from your scripted, optical perspective. The NPC is always oriented towards the player at hand via the directional optics of the camera. Not only is the avatar the projected human body in the game, the camera is too.[44]

The two simulations of the human body, the avatar and the NPC, are similar as images within the game but as simulations they are historically and ontologically different.

This research has an interest in understanding how the relations between avatars and NPCs can evolve, in parallel with how humans are interacting with bots online. Both cases propose a digital interaction between humans and programmed digital agents. This suggests a (semi) virtual collective co-existence and the politics of collective behaviour, norms and ethics that that entails. Today, a game, but tomorrow it could simulate a real milieu. Such 'real' interactions can be seen in military spaces and have been extensively portrayed in Harun Farocki's work *Serious Games I-IV*[45] from 2010 which addresses the military digital simulations used by the American army to train soldiers for real situations and experiences. The military also uses simulations of sites where soldiers have been deployed and experienced trauma. By 're-situating' them into these virtual, simulated sites and events the idea is to process PTSD syndromes. There are also the real time simulations used for military weapons training and

[43] However, more developed NPCs exist but are based in a specific environment that the player traverses.
[44] The player's avatar and the avatar's relationship to the course of play within the game are made visible via the game-camera, which has an indirect coupling to avatar movements. (Laurier and Reeves, p.182)
[45] Farocki, Harun, *Serious Games I-IV*, film, 2010.

combat, which when used in the real becomes a tool of control over life. Hence there is a whole field dedicated to the deployment of simulation in the military. For example, the interactions between humans and simulations have specific scholars and the filed is known in the US Military Defense Department as LVC[46].

The intelligent simulated crowd

> 'Many producers and consumers of training simulators and game environments are beginning to envision a new era where psycho-socio-physio-logical models could be intertwined to enhance their environments' simulation of human agents´.[47] Silverman, et al., 2005

When in the urban physical crowd, we understand and feel other bodies and personalities. Physical human interaction and communication is composed of both spoken and bodily language. However, in the virtual realm the digital bodies surrounding us do not have the bodily information to psychological and physical states e.g with an accelerated heartbeat, flush, odour or gestural language. When an avatar the person behind the virtual corpus can easily dissimulate his or her actual physiological or psychological state. In extension this affects the psychological and dynamic state of the crowd as a whole.

When using customer services online, interaction with a bot is usually indicated. In games, however, there have been several occasions when a player has mistakenly understood the

[46] The LVC categories as defined by the United States Department of Defense in the Modeling and Simulation Glossary as follows: Live - A simulation involving real people operating real systems. Military training events using real equipment are live simulations. They are considered simulations because they are not conducted against a live enemy. Virtual - A simulation involving real people operating simulated systems. Virtual simulations inject a Human-in-the-Loop into a central role by exercising motor control skills (e.g., flying jet or tank simulator), decision making skills (e.g., committing fire control resources to action), or communication skills (e.g., as members of a C4I team). Constructive - A simulation involving simulated people operating simulated systems. Real people stimulate (make inputs to) such simulations, but are not involved in determining the outcomes. A constructive simulation is a computer program. For example, a military user may input data instructing a unit to move and to engage an enemy target. The constructive simulation determines the speed of movement, the effect of the engagement with the enemy and any battle damage that may occur. These terms should not be confused with specific constructive models such as Computer Generated Forces (CGF), a generic term used to refer to computer representations of forces in simulations that attempt to model human behaviour. CGF is just one example model being used in a constructive environment. There are many types of constructive models that involve simulated people operating simulated systems.

[47] Silverman, B. G., Badler, N. I., Pelechano, N., & O'Brien, K. (2005). 'Crowd Simulation Incorporating Agent Psychological Models, Roles and Communication'. Retrieved from https://repository.upenn.edu/hms/29 (preprint version) alternate published version available at https://apps.dtic.mil/sti/pdfs/ADA522128.pdf p. 1

accompanying NPC as being another player. This confirms the evolution towards a semi-virtual, symbiotic, collective co-existence, where bots and humans may seem to interact on equal terms.

When using AI in the creation of games and agents, in contrast to coding and programming which can be tweaked and customised, the AI needs to be implemented at an early stage. For example, if you want to grow a tree, the AI (and linked data set) will be in the seed planted in the earth, and then when you see the tree fully grown, you will see the outcome of the AI. A traditionally programmed tree will appear exactly as programmed/coded using the available behavioural references. This tree can be altered when fully grown, re-programmed, but will not have the sophisticated smartness, 'intelligence' that AI can offer.

An animator (the person who programs the computer games agents' animation: the behavioural patterns and gestures) at Ubisoft told me of an instance when a set of agents (NPCs) were AI programmed using a behavioural data set. Over the course of two days, the computer was running the sets. When they opened the program/game all the agents, NPCs, had disappeared. They were finally found hiding in a cabin, at the edge of the game's environment, wildly gesticulating. They were programmed to flee and hide from the player. Even though the programming of AI has evolved since then, this shows how the AI is literally interpreting what we (the programmers) are giving as initial logic and data.

Harun Farocki in *Parallel I-IV* traces the aesthetics and politics of computer games from the 1980s until 2012. In this series of videos, specifically in *Parallel IV*, the player encounters the NPCs and challenges their limited capacity and intelligence. This confrontational interaction disrupts the game's narrative and the logic of how the NPCs were programmed for that specific situation. Hence, they start to glitch and break down. The voice-over of the film narrates these confrontations as 'Limitation of human freedom of action', a statement which points towards a lack of agency of these NPCs considered as humans. This research is interested in understanding these NPCs as simulated humans, hence an image of a human and crowd which should be allowed or considered to have agency within a collective or hierarchically organised setting. This, because the image, simulation, of a crowd is necessarily political. Hence, the politics of the NPCs affects the perception of the crowd as political and will be read as such. Therefore, it is important not only to identify the limitations of the NPCs, but also how these limitations reveal what possibilities of agency are given and can be given to the NPCs within

this artificial world. This agency is not only key to creating a realistic game, but is also decisive to the nature of the interaction and co-existence between humans and bots/NPCs in the future.

This relation and co-existence relate directly to how the NPCs could evolve in using AI and machine/deep learning (especially as in the near future the computer games will be fully automated in their production through the self-producing system using machine learning which is then connected to the cloud). An interesting aspect of this is the fact that today when using AI in modelling the behaviour of digital agents in computer games, there is a loss of control/obscurity in how the AI when in a machine learning mode is developing itself and in how they use the given data set, and what the behavioural outcome will be. The similarity between this loss of control and the need to control/program/predict a crowd's behaviour is an interesting parallel. As mentioned earlier, the crowd seen as a mob is an unruly crowd which needs to be controlled. Hence when programming a crowd with AI, there is also a loss of control over how the agents will act, given the processed behavioural data set.

Free Guy (August 2021 in the US) is a Hollywood blockbuster where an NPC emancipates himself, and through this realisation engages the other NPCs to mobilise collectively and regain control over their existence within the game. The television series *Westworld* also portrays a revolution of AI robots populating the physically simulated concept of a computer game set in the Wild West.

Hence the NPC, as well as the agent of the crowd simulation, is a peripheral being with whom we can identify politically in a struggle to gain agency and subjecthood. Even the entertainment industry starts to address the democratic values/agency of the agents populating their computer games.

The sequenced based crowd simulations used for film and crowd management are images and predictions of crowds and their behaviour. Today we live in a world where what was referred to as 'cyberspace' has merged with our reality. Therefore, the virtual world is intertwined in our daily life through various devices and technologies. These technologies are continuously refined and optimised so as to continue that merging. Hence the simulations will be even more symbiotically assimilated to our analogue reality.

It is not only in games, from *Assassin's Creed* to open-world games to *The Sims*, that we interact in various ways with a populated, simulated world. This interactive sociality has the

strong potential to evolve through the use of harvested behavioural data from the players[48], but also data from other surveillance and tracking systems as well as a population's biometric data. (For example the aforementioned launch of Facebook's Metaverse).[49] The NPCs will evolve in the human player interaction and from the overall evolution of the game, where data is produced then used for updating the game (the so-called feedback loop), through time.

Data produced from the crowd's behaviour and bodies will allow for the possibility of visiting the doctor virtually, projecting our bodies through simulations. As we speak, research and results are being gathered on how online chat platforms and forums will be able to use projected avatars, with photo-realistic facial animation, of the users instead of a face on a screen. This enables a corporal projection into the forum, which could also be used for any simulated online platform (as mentioned the recent creation/planning by Meta of the Metaverse confirms this)

Future virtual health care centres may even feature doctors who are not only avatars of real human doctors but are highly (AI) intelligent bots/NPCs, with all our harvested health and behavioural/habit data to hand. Our body scanned projected avatars, filled with our biometric data and health journals will be available to diagnose us with. The step between the Zoom camera to that of the camera operating the game is small. Within this new reality the embodied exchange, the corporal language and characteristics of the digital agents will become more important as the simulated interaction needs to be trustworthy.[50]

Virtual platforms which will operate our 'real' (IRL) needs, may be social, medical, educational (class attendance or even school plays) or legal where our simulated bodies may be necessary for control or presence/performance (aligned with our data) is not such a distant reality. This crowd sourced data will hold the diagnoses of populations and thus be highly valuable.

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[48] Here again the creation of a metaverse by Meta (formerly Facebook)/ Zuckerberg confirms this.
[49] A metaverse is a network of 3D virtual worlds focused on social connection. In futurism and science fiction, the term is often described as a hypothetical iteration of the Internet as a single, universal virtual world that is facilitated by the use of virtual and augmented reality headsets. This is how meta describes the metaverse: 'The metaverse will be social. 3D spaces in the metaverse will let you socialize, learn, collaborate and play in ways that go beyond what we can imagine. https://about.facebook.com/meta/
[50] An embodied bot whose purpose was to host and communicate with patients was presented at the Intelligent Virtual Agents conference in 2017. The audience and responders reacted to the poor aesthetic features and characteristics of the bot-robot which made it useless for its task. As mentioned earlier the physical intelligence will increase in importance hence the need to have an embodied understanding of not only the AI agent but what, in extension, how this new labour force will present itself when mimicking human behaviour.

What is of importance is how the data received by science, has the potential to be democratically archived, but instead is set up to be monetised and sold to highest bidders (as has been the case with the NHS selling health records to private corporations).

Hence the importance of computer games to this research: they are central to understanding how our simulated co-existence and collective behaviour in the future might present itself. Computer games have the skills and economy as well as creativity – and are currently producing immediate interactive environments where avatars and NPCs interact.

The architecture of these games, the logic, aesthetics and population are currently made through vast catalogues of pre-modeled characters, humans, animals, creatures[51] and materials are already creating these digital interactive environments and populations. These catalogues can be easily and rapidly used, and in the future may be automatically linked to the AI which will develop the game. When games become fully AI operational and connected to the 'cloud' they will be able to produce themselves (autonomously) from a provided synopsis; shortening the chain of production. Many programmers and animators will soon become obsolete and already feel the urge to climb the hierarchical ladder within companies in order to keep their jobs. An AI self-developed game is interesting to study and the importance of defining the NPCs agency even more important when the game (or any virtual interactive world) becomes fully automated.

> 'With the growing significance of immaterial labor, and the concomitant increase in cultivation and exploitation of play—creativity, innovation,the new, the singular, flexibility, the supplement—as a productive force, play will become more and more linked to broad social structures of control. Today we are no doubt witnessing the end of play as politically progressive, or even politically neutral'. Galloway, 2006.[52]

The aesthetics, characteristics and corporal language of these agents, presenting a mimicked humanoid workforce, will have a socio-political impact on future collective behaviours and co-existences[53]. The agency of the AI characters and bots is even more important, not only

[51] produced as we speak by specific labs linked to the computer games' manufacturers, such as Ubisoft , for example,who are creating massive catalogues of pre-existing animals and environments.
[52] Galloway, A., *Gaming: Essays on Algorithmic Culture*, University of Minnesota Press, 2006, p.74
[53] A phenomenon widely researched within the field of Human Robot Interactions (HRI) which includes the moral and ethical codes which these relations will entail. However, this research will not be able to

from a moral and ethical perspective, but from a socio-political one given the agency of how a crowd operates: as crowds and collective behaviour is inherently political, as has been previously addressed. Hence, studying the digital agents' characteristics and behavioural frameworks can educate us on the agency of these actors as they evolve.

Patrick Bach, CEO at UBISOFT Stockholm, often points out that computer games aim firstly to entertain. The logic of the game is to make the human player/the avatar feel powerful, essential and in central focus. The world and narrative of the game unfold in the player´s direction (unless the player reprogram the narrative as in open-world games, but even then the camera operated world of the game is still directed and operated to and by the player). This puts the player at the centre of the narrative, in a self-centred 'scripted space' – a phenomenon interesting to consider given our individualistically oriented society, and therefore in how bots are to be programmed (towards the human/avatar). How would a 'democratic' camera articulate itself?

When will the predictive simulation of the crowd and social behaviour be valued as more real than the real crowd's behaviour? Maybe when the so-called loop/feedback system has been in use for so long that the original behaviour has been transmuted such that it no longer exists. Or when the simulated crowd has become more trusted than real crowd behaviour, based on models produced from loops of such large processed statistical data sets which in turn creates a generalised default crowd, we will have reversed the facts. What this means is that the 'loop', where the circulation of gathered data is used to predict and model the crowd's behaviour, is in turn tracked and surveilled, gathering new updated data, etc. This (feedback)[54] 'loop' distils and rationalises the crowd dynamic and gestures in favour of the system in place. This distillation produces models/simulations which become more and more 'trustworthy' and 'realistic'. When the loop has been looped so many times that the original behaviour is lost, and the full assimilated transmutation has been established through new implemented habits; new collective gestures and behaviours based on predictions and data will produce a new citizen, hence an updated crowd agent. A futurity that is angled back at populations in the present.

address this in detail but just wanted to acknowledge, and speculate on the impact on crowds these AI agents can have.

[54] Which stems from cybernetics – the fundamental self-correctional logic of intelligent systems but instrumentalised for specific purposes.

At the same time in computational systems processing large amounts of data, such as crowd data, simplification is necessary for more manageable processing. Presently, in crowd simulations, there is a need to simplify the general crowd dynamics as well as the individual agents' characteristics and dynamics, mainly due to the current computational capacities. However, this is in the process of changing as several computers can now work simultaneously toward a common 'cloud' augmenting computational capacity and data processing. At the same time, the use of AI and machine learning could potentially augment the details and re-complexify the behavioural codes of the simulated crowd.

> 'André Bazin defined realism in the cinema as a technique to approximate the basic phenomenological qualities of the real world. And he knew well that "phenomenological qualities" did not simply mean realistic visual representation. It also means real life in all its dirty details, hopeful desires, and abysmal defeats'. [55] Galloway, 2006.

Creating an even more realistic (game) crowd and environment would implicate not only a more detailed game but include the flaws which in themselves would encompass a critical capacity in the given game, environment and narrative. However, we are not there yet and the limited specificities of the agent's behavioural codes and features impact on the overall aesthetics and politics of the crowd. As has already been argued, this simplification can also be intentional for the crowd to blend into the background of a given narrative. Hence, the intent of these simplifications tends to be objectifying; homogenising the crowd and consequently stripping it of agency allowing us to draw parallels between the automated behaviour of the user and the surveilled and disciplined crowd in authoritarian regimes where individuals are monitored for the purpose of a subsumed crowd, therefore this homogenisation and standardisation of the crowd is political.

Currently many computational crowd simulation models have emerged as models for social science studies by creating artificial societies where social processes such as individual and collective behaviour can be analysed and studied. The use and results of these studies are yet to be known.

There are attempts to create a more complex crowd which will probably be used for crowd safety measures. The intention of these studies is to save lives and not organise them into

[55] Galloway, A., *Gaming: Essays on Algorithmic Culture*, University of Minnesota Press, 2006, p.74

market and political strategies. An important reminder here is that most crowd safety experts confirm that crowd simulations are not suitable for crowd safety models of evacuations and emergencies as crowds are composed of heterogeneous people acting according to their own agency. Hence, if the intent is to use digital simulation for crowd safety purposes there is a need (if possible) to develop more realistic digital crowd simulations when lives are to be protected.

> 'The idea of using a psychological model is that agents will operate independently in perceiving the simulated world and in forming their reactions to it. At no point will they be pre-scripted or programmed via rules or procedures. We only model personal value weights on a need hierarchy as well as cultural standards, and individual agents will make their own (micro)decisions that lead to the emergent macro-behavior'. Silverman et al., 2005[56].

The computational simulation of a crowd can appear as an image, an illusion of a collective presence, but it is far from an illusion when used as a predictive model with the intent to control future collective behaviour. The portrayal of the inter-relations between AI agents, or the immediate relation between the bot/NPC and the avatar (both systems of semi and full simulation of humans/crowds) intends to adapt and heighten the experience of the collective.

A conversation with Stratis (AI specialist) and Alexander (animator) from Ubisoft covered AI and the believability of how a player experiences the NPC and its behaviour as real or trustworthy. It is not only the aesthetics that matter, the movement, gestures and posture are also essential for the NPC to appear intelligent or interactable with. In one game, for example, there were complaints about the clunky, robotic appearance of the NPCs which were supposed to be human military. In response, the programmers did not change the AI of the NPC, but only the movements and gestures – yet the players reported a major improvement and change in the intelligence of the NPCs. This confirms that behaviour, physical and aesthetic intelligence is necessary in creating trustworthiness in the virtual bot/NPC human interaction.

An important aspect is how the behavioural codes and intelligence will in future develop these crowds with advanced AI and machine learning, where the crowd agents can learn cumulatively

[56] Silverman, B. G., Badler, N. I., Pelechano, N., & O'Brien, K. (2005). 'Crowd Simulation Incorporating Agent Psychological Models, Roles and Communication'. Retrieved from https://repository.upenn.edu/hms/29 (preprint version) alternate published version available at https://apps.dtic.mil/sti/pdfs/ADA522128.pdf. p. 3

from the environment in which they operate, but also from the actions and interaction with the avatars, players.

Another interesting potential development will be when behavioural data generated from real crowds can be implemented to simulate a realistic crowd. For example, to create a game which posits a socio-realistic tradition and not just an entertainment or consumer-based narrative with avatar-as-superhero logic. A game which embraces a socio-realistic environment and crowd, as Galloway proposed in 2006?[57]

A highly developed AI and deep-learned crowd could propose performances and behaviours, which we may not immediately understand, as the programming of AI is implemented at the origin of the creation of the simulated crowd evolving mainly independently.

To sum up, a highly developed AI, a machine-learned crowd, could be unpredictable and possess skills which surpass the avatar's (the projected real human being) within the simulated world. A crowd of NPCs with behaviours and gestures we cannot foresee, maybe even acting and evolving autonomously. An interesting aspect here is to see how this intelligent virtual crowd will interact with the physical crowd and how that will affect tracking systems, and what data will be produced from the interactions.

When the crowd is being complexified by new technologies, the perspective of the crowd and collective behaviour will change, to evolve with the technologies. It is important to remember (as previously mentioned) that in general the crowd is still seen as a destructive force which needs to be rationalised and controlled.

Yet, according to recent studies the individuals within the crowd do not abandon their rationality or surrender their identity to a mob mentality. Instead, they become highly sensitive to what those around them are doing and become strongly co-operative as a result. This aligns with Canetti's thoughts, in the 1950s, on the unifying solidarity which can be experienced when in the crowd. 'All are equal there; no distinctions count, not even that of sex. The man pressed against him is the same as himself' (Canetti, 1960, p.15). Even if the experts, today, deny the perception of the masses as a destructive force it still reverberates in the current general perception and handling of crowds. The crowd is still perceived as the bearer of wrongdoing,

[57] To find social realism in gaming, one must follow the telltale traits of social critique and through them uncover the beginnings of a realist gaming aesthetic. To be sure, there is not a realist game yet like de Sica's The Bicycle Thief is to film." Galloway, 2006, p. 76

as for example in the fatal incidents in Hillsborough stadium in 1989 where later during the trial the crowd was finally proved innocent and it was concluded that police crowd management was responsible for the disaster. In April 2016, the new inquest's jury found that the 96 football supporters had been unlawfully killed due to Chief Superintendent Duckenfield's gross negligence, and that no behaviour of Liverpool supporters had contributed to the disaster. Still, the police had tried to blame the crowd for being drunk and disorderly. However, since then, nobody has been held responsible for the deaths and injuries (Conn, 2021). This is not an isolated incident of a crowd being automatically accused of creating destructive chaos when actually an individual or small group of persons, usually of authority, were to blame. It is important to keep this in mind when observing how crowds are portrayed and modelled by digital control and prediction/surveillance systems. The exercise of control and crowd management by digital means is that of rationalisation, with the aim to standardise and homogenise collective behaviour. This handling and perception is playing an important role in the suppression of the agency of the crowd within a post-digital reality.

This chapter has contextualised the crowd historically and theoretically, addressed the simulated crowds of the crowd simulations and the interactive simulated crowd of the computer games while giving a brief insight into the aesthetics and politics of the tracking and surveillance tools of crowds and collective behaviour. What has been identified in the perspective of how the crowd is operated and represented in these various instrumentalisations, is that the crowd is still considered as a mass lacking individual intelligence and agency (Le Bon, Freud). A crowd, to be operational, needs to be rationalised to function as an image of a crowd but without having the identity of one. What has also been addressed is the importance of the symbiotic relationship between organic and digital crowds. How their future co-existence and agency can articulate itself within a (western) market based digital world. It entails the postdigital where the disenchantment and the permeated digital existence of the crowd today allows for a critical standpoint from within these crowds upon how they are mediated and governed

With the development of AI and machine learning the emancipation and agency of the digital crowds can take a new autonomous turn if governed by a democratisation of data and democratic rule or influence. In this specific case the data which will feed this AI and what purpose it is programmed for will determine the politics of those crowds. However, there seems to be an interest, from a monopolised market/market perspective and authoritarian

governments, in keeping both organic and digital crowds in a controlled state rationalising their collective behaviour.

Ch.2: The default crowd.

Operating the crowd subject as a standardised mass

When using our computers and smart devices, surfing and shopping on the internet or scrolling through our social media we encounter situations where we are confronted with various default modes and options, from cookies to user modes of pre-selected choices. As we are focused on the task at hand, be it printing a text, shopping for shoes or reading news or social updates on friends, we navigate through these options without much thought, as our focus is somewhere else. Most often we accept the given default options proposed to us as to get on with our task or because we are in a hurry. These options and modes are linked to our accelerated modes and operations as they enable a faster and easier use of computational tools. Default is also linked to the complexity of these tools and proposes an alternative smoother navigation of our digital contemporary life.

Accepting (when the choice is there to make) these 'user-friendly' default options and settings is exercising and producing a sense of ignorance or rather agnotology[58]. As a user you operate on the surface of a proposed user friendly environment while underneath it is dark and complex, an obscure and dissimulated space of a myriad of activities, a hidden place where not only the data processing takes place but where multiple protocols are concealed and data is harvested at full speed.

> 'The hidden aspects of the media are the things that should be taught, because they have an irresistible force when invisible.When these factors are ignored, remain invisible, they have
> an absolute power over the user'. Marshall McLuhan, 1977.[59]

When in a 'defaulted' (shortcut) mode the user is distanced from the complex systems and infrastructures which are in full operation. These dissimulated operations have ramifications on

[58] By 'agnotology' I refer to the way in which computation facilitates a systemic production and maintenance of ignorance. Computational technologies direct us towards a passive trust in widely delegated, yet obfuscated, actions (see Berry 2012).
[59] Marshall McLuhan, "The Medium Is the Message," lecture, ABC Television, June 27, 1977 Quote extracted from the transmediale reader Across and beyond, *A transmediale Reader on Post-digital Practices, Concepts, and Institutions* edited by Ryan Bishop, Kristoffer Gansing, Jussi Parikka and Elvia Wilk, 2016.

the body of the user. Gestures and daily habits are altered according to the requirements of apps and devices. When used in the millions it develops an overall standardisation of people's gestures and habits, and consequently an homogenisation of the crowd's collective behaviour.

This chapter addresses how these default modes and settings are used on organic and digital crowds to shed light on how these dissimulated operations are subverting collective agency while homogenising the crowd's behaviour. Through the art practice this research investigates default settings in correlation with default characters to achieve an embodied and visual understanding of the politics, and the bodily and behavioural ramifications of default modes and systems.

Default: a pre-established standard mode of operations

In software and apps, default is usually pre-established as the value or setting that most users would probably choose. It is statistically prepared for us from our already harvested data. The default is the product of our gathered collective data. The pre-programmed and automatically delivered options propose a simplified interface for the user while less information has to be passed and examined, made visible, during each program request.

When computers communicate with each other, there needs to be a standard set of rules and instructions that each computer follows. A specific set of communication rules are called a protocol. Because of the many ways computers can communicate with each other, there are many different protocols, too many for the average person to remember.

> 'New automated protocols are designed to influence and modify human behaviour at scale as the means of production is subordinated to a new and more complex *means of behaviour modification'*. [60] Zuboff, 2018.

In networking, 'default' is often used in reference to protocols. These protocols form a web of computers with multiple dissimulated protocols that are ungraspable to the user. This mesh of linked computers and smart devices represents the standardisation not only of the systems we operate but a standardisation that implicitly affects our habits and behaviour in the long run: a massive web binding/connecting our behaviours creating a homogenisation of our daily gestures linked to our mobile devices and online existence.

[60] Zuboff, S. *The Age of Surveillance Capitalism*, Profile books, 2018, p. 19

In Swedish, default options or settings are named as '*förval*' which means that it is the choice made before us, a pre-selection. A selected option made for you, available to use before other options. Yet in English default brings to mind the choice we make by default when we do not make a choice.

On one hand, we have a pre-selected world offered to us, while on the other hand it is the one made for us when we fail to make a choice. In both cases we are offered a shortcut while being sidetracked.

The word default can also be understood as both a pre-made choice for us or when faulted/in the wrong. In French '*un défaut*' is an imperfection. What is striking here is that this curious amalgam of the two words and definitions can tell us how default modes impact the crowd, faulting them by keeping them in ignorance and not allowing them to act upon the computational tools they operate.

Involuntarily trading data for shortcuts

> 'If you do not interfere, by explicitly denying and change your default settings, restoring them to their initial settings your traces of action can be passed to a third party. The default settings allow the manufacturers to harvest data. Mapping your traces which are then combined with other information to build up detailed pictures of your behaviour' [61]. Greenfield, 2017.

When we are moving in the urban landscape our gestures and whereabouts are tracked by multi-target tracking systems. When we use our mobile devices, we are also tracked. The GPS tracks our whereabouts and health apps track our actions (steps, sleep modes, workouts, etc.) but we can also allow our heartbeat and oxygen flow to be tracked through the earbuds we wear. All these tracking systems produce a vast amount of biometric data.

This self-inflicted internal tracking referred to as the 'quantification of the self' allows for a scanned and uploaded body. By giving away biometric data the body becomes instrumentalised within the system. With the belief of self-empowerment, we upload our body to be monitored. There is a common generalisation of our habits and gestures as we all adhere to the same apps and devices regulating our behaviour. The normative frameworks embedded

[61] Greenfield, A. *Radical Technologies*, verso book, 2017. p. 25

in these technological systems impact the aesthetics and outputs. Hence, we, the crowd, condition ourselves towards a collectively operated and modelled body engendered by the norms and goals of the manufacturers or authority who initiated them. These authorities are, in the Western world, dominated by a capitalist system and a few corporations (the big five) where humans are firstly seen and acted on as consumers rather than citizens.

Do we by default disempower ourselves? The opacity which surrounds us is intensifying as we speak. Even if there are attempts with new GDPR legislations, the new EU law on the ethical use of AI, and a semi-transparent self-management of 'cookies', there is still an enormous, dissimulated network and infrastructure which works upon us as a whole, as a crowd. Default options reveal the complexity of the systems we operate today, impossible for most of us to grasp. Unlike the machinic logic of, for example, a car, we cannot just open the hood to see the engine and cognitively understand how the different elements allow the car to move. We are confined to a situation where the computational devices we depend on and use daily are invisible and beyond our comprehension while their operational mode standardises our gestures thus transforming the crowd into a synchronised mass.

Homogenising the crowd: rationalising behaviours

The standardisation of behaviours emerged with technologies and the governance of crowds. In the wake of industrialisation the body grew aligned with the machinic rhythm and assembly line tasks and the urban crowds organised into masses. Kracauer published *The Mass Ornament* in response to this new collective organisation of the urban masses.

Not only were the crowds homogeneously organised according to mass production, but at the same time, and more severely, through political strategies of emerging authoritarian regimes: two modes of standardisation which share a common aim to supervise and organise the crowds into productivity.

> 'Machinelike bodies, increasingly, were standardized bodies, treated like other components of mechanical systems. Standardization was a feature of commodification as well.' Rhys Morus, 2002[62]

[62] Rhys Morus, I. ed.*Bodies/Machines*, Oxford: Berg. 2002 p. 5

The continuous reproduction of homogeneity was an effect of mechanical standardisation. One of the aspects of mass culture that Horkheimer and Adorno were most critical of was its alleged production and reproduction of sameness. In *Dialectic of Enlightenment,* they manifested their critique of mass culture as a suppressor of subjectivity by de-individualising standardisation and that the masses allegedly insist unwaveringly on the ideology by which they are enslaved' (Adorno and Horkheimer, 1944, in Borch)[63].

Kracauer and Benjamin however were optimistic about the emerging technologies at the time. Still, Benjamin shared the problem of the reproduction of sameness when it came to art, in the famous essay *The Work of Art in the Age of Mechanical Reproduction* from 1935.

Erich Fromm, on the other hand, reacted to the modern individual's isolation in Kracauer's *Mass Ornament* by arguing that there were three 'mechanisms of escape' from powerlessness and isolation – one of which was 'automaton conformity', a phenomenon where 'the individual ceases to be himself. He adopts entirely the kind of personality offered to him by cultural patterns, and therefore, becomes exactly as all others and what they expect him to be'. This is 'induced from the outside', not from inside as he is already part of the automated crowd. An automaton is not alone.[64]

If considering Fromm's theory as a phenomenon that occurs in a society where people are polarised and atomised but also oppressed by a financially and politically strained situation of precarity, the theory of the automaton may apply. Fromm argued that an individual adopting the automaton conformity would be ready to submit to new authorities which offer him security and relief from doubt.

The relation between authoritarianism and the automaton played a key role in the emergence of Nazism. Again, the similarities of political currents in the 1930s and today's surge of extreme right-wing movements and authoritarian regimes are important to note because the automation of behaviours is linked to political currents and power/influence. The automaton when composed as a crowd becomes a malleable mass prone to authoritarian governance. With this in mind, Fromm's notion of automaton conformity can be of interest when observing how default settings can operate on us as crowds. We adopt the proposed default options for

[63] Borch, C., *The Politics of Crowds: An Alternative History of Sociology*, Cambridge University Press. 2012 p.216.
[64] Fromm, E. *Escape from Freedom*, New York: Farrar & Rheinhart, 1941, p.118; p.158; p.163

our convenience in exchange for our data and compliance to systematised behavioural patterns.

Hence, this reproduction of sameness and critique of mass culture where the agency of the individual subject is swallowed by the expansion of mass society with the development of new technologies resonates in today's operations of crowds; especially regarding default settings, options of crowds and the predictive models of crowd simulations. The crowd member has difficulty, or rather no access to an outside, as the postdigital crowd is so entangled in and by digital technologies. As previously mentioned, the global surveillance systems operated by GPS satellite systems puts the whole crowd into a constantly surveilled mode. There is no outside unless you leave the earth's orbit, beyond the satellites.

Another aspect of how power can be exercised on crowds in relation to the automaton and sameness is: contagion. Gabriel Tarde conceptualises contagion as an inherent trait within the crowd. It is the behaviour of acting like the person beside you, creating a collective state. The crowd is prone to contagion and within this automated standardisation through technologies, the contagion effect becomes instrumental in social media drives, or in how to organise and predict the crowd's behaviour in simulations. The development of EI, emotional intelligence of the digital crowd character, also plays a central role in this development, giving it a psychological facet. The use of psychological models in the modelling of collective behaviour facilitates its control and management. At the same time social media becomes the perfect tool for the extreme right to exploit the contagion effect by implementing false narratives which propagate themselves. A phenomenon which is also supported by Emile Durkheim contestation of Tarde's and Le Bon's notion of contagion, '[the] reason why we follow a particular act is not that it appears as a contagious example before our eyes but rather because a social fact exercises its power over us' (Durkheim, p.128).

Tarde's approach is more of a psychological and psychological mimicry, while Durkheim argues for the social effect of how we adapt our behaviour according to others or to socio-political norms. When it comes to new technologies both aspects are used in how crowds are programmed to act according to the given (market or politically oriented) system, either in the prediction of crowd behaviour or as clickbait. Wendy Hui Kyong Chun refers to the contemporary contagion effect as homophily: acting like your friend, people like you. (Chun,

podcast, 2019) The contagion effect inscribes itself into our habits linking us to a network which entangles all singular actions into larger patterns: those of the crowd.

The postdigital era is drastically different in how we are operated online and through new technologies, yet the organisation of the masses remains the same, albeit complexified and intensified, through the use of intelligent technologies. However, when it comes to the gestural catalogue of the crowds there is a clear difference. The repetitive mechanical gestures which emerged with industrialism, masterfully portrayed and drawn to its extreme in Busby Berkeley´s mesmerising synchronic mass choreographies and referred to in reference to the urban crowd in Kracauer's *Mass Ornament,* now co-exist with the gestures produced by our digital environment. These gestures are not expressive, as the moving arms and hands of the assembly line, but small and inverted, indexed, passive yet tense. Small smooth gestures of swipes and taps. Bodies tilting downward when inclining our heads toward the screen. An immobile yet tense posture which leads to neck and back pain in contrast with muscle aches or physical injuries inflicted by the machines. Instead pacified and subsumed movements of minimalistic gestures framed by the screen.

> 'These are part of a growing vocabulary of abstracted gestures, codified and even patented interactions, which cannot be conceptually distinguished from the inescapable design of digital interfaces'. [65] Ludovico, 2017.

At the same time, there are also global collective choreographies engendered by social media platforms and health apps: a mass choreography made by online atomised bodies. On TikTok millions of people perform the same choreographies to a short segment of a song or tune. The learning of these choreographies to then be shared online brings about a sense of connection amongst the participants. However, the performance and its accuracy, rated by likes and followers, dampen that feeling. The interest here is that of the technicalities of the performance. The short sequence, extract/detail from a song, decontextualises the experience of its originality. The choreographies are simple, brief and repeatable within the given time frame. Everything has been compressed and simplified so as to adapt to the accelerated

[65] Ludovico, A. *The Touching Charm of Print* in *across & beyond: A transmediale Reader on Post-digital Practices, Concepts, and Institutions*, eds Bishop R., Gansing K., Parikka J., Wilk E., Berlin: Sternberg & Transmediale, 2017. p. 107

economy of the app, decreasing the users' patience as they become victims of the prevalent distraction economy that these new technologies have brought upon us/the crowd. The simplification of these collective dances resonates in all collective gestures and crowd behaviour aligned with the new technologies and today's accelerated society. This form of abstraction and adaptation to apps and devices is aligned to the logic of the application of default settings and options, where the shortcut is favoured. Hence, they become instrumental in the acceleration of our use of apps and smart devices.

The Default Character

Figure 7 - Still from Di-Simulated Crowds (2018).

In the early online research on digital crowd simulations, the so-called default character/agent came into focus. A standard, basic option of a digital human agent, available to use to compose a virtual simulated crowd within the software.

The correlation between the standard 'default agent' and the recurrent 'default options' occurred as essential in how the crowd is operated and how the simulation, the virtual representation of a crowd, is articulated.

The swarmlike and rational behaviour featured in crowd simulation showreels proposed an ultimate mathematical control over the crowd making it flock like birds or shoals of fish producing mesmerising formations beyond the bounds of possibility for humans. When observing these crowds up close revealed that they were made of simplified identical human figures – default agents.

When creating a crowd simulation, we can by 'default' use the 'default pedestrian/character'. The proposed default character is a representation of a standard human with simplified features

and characteristics, with limited intelligence and a choreographic vocabulary adapted to act collectively.

The default agent is a white male in almost all crowd simulations. This phenomenon suggests that the white male is the standard human of the simulated crowd. Some software (such as Crowd FX and the more recent anima) has a catalogue of personas, derived from the default character, in different clothing and hairdos as well as skin colour and gender. Yet, if creating a crowd by default it will most often become a white male crowd. In the history of crowd theory and sociology the crowd is referenced by Le Bon as feminine. This distinction is as pejorative as his views on crowds as barbarians, but here it is hysterical women he has in mind. The rational crowd simulations use of the white male not only belongs to a male dominating (patriarchal) view but may also be how males traditionally embody rationality.

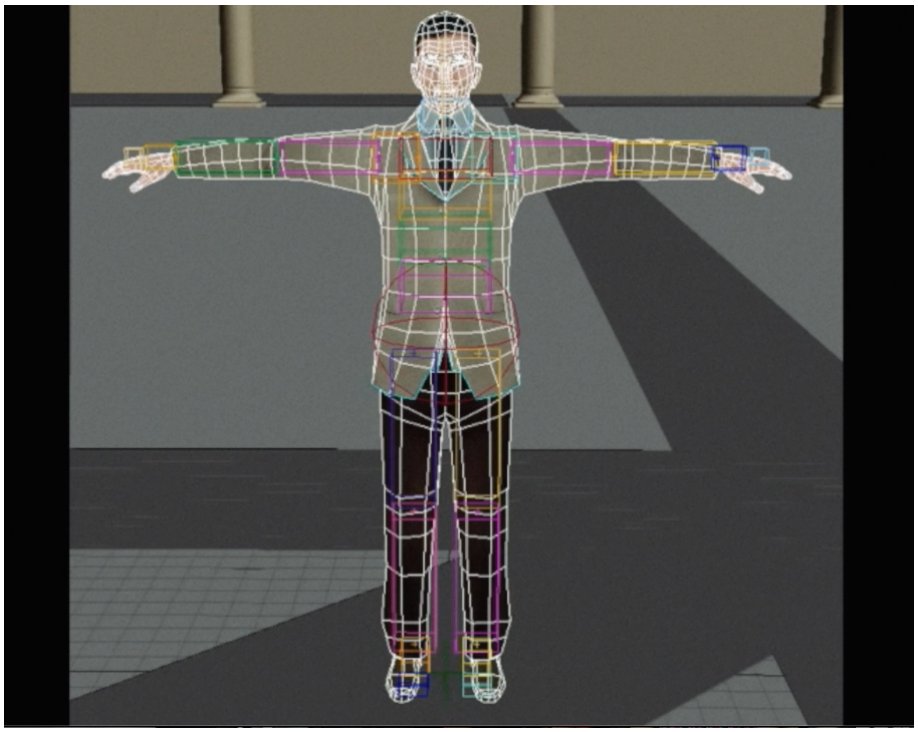

Figure 8 - Default character/agent in T-Pose, detail from the film Default Character (2016).

When the default agent is given to us by the software, he appears un-programmed/blank. The 'default' posture before being programmed is the so-called 'T-Pose'. An erect body with spread out arms perpendicular to the body's trunk. A body available to use, ready to receive or embrace command.

This posture, an image of an unprogrammed body, is highly charged. What comes to mind is the statue of Jesus in Rio-de-Janeiro in Brazil as well as Leonardo da Vinci's The Vitruvian Man who represented the ideal man according to Da Vinci. In both cases it is a figure in a symbolic pose which encompasses many men. Hence, the default agent becomes even more of a generic body when in the T-pose posture as it is not yet programmed. Just a hollow figure ready to receive command.

In computer games and films (according to the conversation I had with Patrick Bach at Ubisoft) the crowd simulations are intentionally made of default agents with simplified features and behaviours to create a homogeneous crowd populating the background or virtual environment. This is so they blend in with the background landscape and do not interfere with the central narrative and characters of the game or film. This phenomenon, when put alongside the multi-target tracking systems that flag abnormal behaviour, recalls the aforementioned phenomenon of an image of a homogenised mass of people represented from afar as an entity where the identity of its members dissolves (Döblin, 1929). An image which aligns with an authoritative perspective on crowds, diminishing them to a submissive mass without common or individual agency.

Even within the context of a game or Hollywood blockbuster an image of a crowd is always a political image, in some cases acting as a metaphor or reflection of contemporary political currents. The favouring of a homogenous 'default' crowd instead of a realistic heterogeneous crowd is in many cases symptomatic of how, it is generally understood, a crowd should be portrayed when part of the background – unless it is supposed to interact with the narrative gesticulate vividly, being slayed or fight as in a battle, revolution or protest. In this case portraying a crowd with superficially applied agency.

The NPC is also a simulated agent with limited AI, but one with a wider range of characteristics and features. It can talk and interact, which it needs to do within the logic of the computer game's virtual world of interaction. The NPC crowd is a variant of the simulated crowd but the same logic of a peripheral assembly of beings acting in the background with limited AI and characteristics remains the same.

Within this practice-based research the default character has become the metaphorical image of the programmed collective body. The simplified characteristics are representative, symbolic of a submissive or subsumed state, but also it has minimised gestures imposed by the reduced

use of our surrounding technology, via shortcuts and default settings. Our smart technologies program and augment our bodies while homogenising our behaviour to optimise collective performance.

Contextualising the default characters:

the depiction of efficient and inefficient collective bodies in art

Figure 9 – Image, Default Character featuring detail of Moholy-Nagy.

The influence of technology on people's behaviours articulated in the arts as in Busby Berkeley's mass choreographies depicting the rise of industrialisation and the aesthetics of the assembly line or Rodchenko´s photos and constructivist collages as well as Moholy Nagy's photoplastic[66] work, show the relation between man and machine in the mechanised industrial

[66] *Photoplastics* are artistic photographic works that result from the combination and interconnection of various graphic and other design elements with photographic works. A photomontage of contemporary images from magazines and newspapers combined to form a new picture. He both drew and painted within these montages, and then photographed them – uniting the components forever into an image that can be reproduced from a negative. Moholy Nagy describes them as follows: "the combination of photographic elements with lines and other additions creates unexpected tensions that go far beyond the meaning of the individual parts ... because it is precisely the interlinking of photographically depicted event elements, from simple to Complicated superimpositions form a strange unity ... the results of this unity can be exhilarating, moving, devastating, satirical, visionary, revolutionary, etc.

era. Straight lines and functionality were central, favouring a body aligned with the new mechanical gestures of industrialism. There was an optimistic belief in industrial development. The gestures developed according to the assembly line were geometrically clear and repetitive.

Figure 10 - L.S. Lowry, The Cripples 1949, Oil on canvas, 76.3 x 101.8 cm.

In contrast with this imagery of progress, the drawings and paintings of L.S. Lowry portrayed a heterogeneous crowd, in an industrial environment, but not at work. The disorganisation of these crowds, evolving organically in space with peculiarities and personalities belonged to a powerless non- performative and producing crowd. A crowd of inoperative wounded or forgotten bodies which usually are not represented or acting as central characters in a scenery from the industrial urbanities. But here they are depicted as being naturally part of a bigger whole amongst and central in the general crowd. Bodies showing people in all their shapes, forms and ages facing the painter.

> The language of 'bodies' thus symptomatically appears to flag the vulnerability of growing numbers of the population abandoned without means of social and

> economic support *as* physical beings, as well as how those same conditions work to effect their reduction to the fragile, isolated quanta of consumption and discipline modelled by financialised structures of social reproduction and the platform capitalism that is currently their most efficient mode of delivery. Articulating the predicament in terms of 'bodies', rather than another term from the archive of political or psychological subjectivation, underlines the prioritisation of vulnerability, or, more generally, life, materiality and affect which constitutes the parameters of basic political analysis today.[67] Vischmidt, 2020.

In urban space the crowd is tracked and abnormalities and abnormal behaviours are flagged as unusual, possibly threatening. This algorithmic equation of singling out the unusual fits into the idea of standardising the crowd to promote homogenous behaviour. Fitting more into the mechanised body of industrialism, or even the glorification of the optimised performative body as represented in the propagandistic posters and imagery in for example the USSR.

In both cases the performativity and productivity of the human body is central in opposition to Lowry's realistic portraiture of wounded and deformed bodies, inefficient bodies of the powerless subject of the crowd. It is the combination of the two which is important here, the all inclusive understanding of the human use in society where not only physical or intellectual capacity is valuable.

Hence, when studying the computer-generated standard of a crowd figure/subject, as in this research, is studying the representation by the computer and software produced subject of the classical categories and traditional notions of politics which is the people, the commons, the crowd. The image of the basis of politics but programmed and generated by the computer. An image of the automated political subject rationalised through digital tools. Hence, an image of the digitally systematised powerless subject.

The crowd this research addresses is about the commons, the citizen yet its political disempowerment is linked to the crowd subject as a user in an accelerated society, where everyday life is systemised and monetised/quantified.

[67] Vishmidt M., *Bodies in space. On the ends of vulnerability*, RADICAL PHILOSOPHY 2.08 / Autumn 2020, p.35

Default Characters- The default crowd in practice.

> "When observing today's crowd simulations, we see subjects, agents in organized patterns correctly negotiating space and others. The cooperation is impeccable.
>
> We are not impeccable. The algorithms programming the ideal digital crowd do not encompass our defaults. On the contrary they use default settings to reproduce us virtually." —voice-over from *Di-Simulated Crowds* (2018)

This practice-led research is anchored in my art practice. The various processes and mediums employed in the practice are here used as multiple investigative methodological processes of exploration and analysis. The role of the practice is to provide – with a contribution of 'experienced knowledge' outcomes in the form of artworks in various forms and materials – conceptual articulations in space of the addressed topic, the postidigital crowd, the default options and characters.

The default character epitomises the programmed crowd subject. In order to embody, explore and study (unravel) these characters where the re-mediating process was used to turn them into recognisable (physical and visual) modes of expressions; making them identifiable, graspable and palpable as embodied conceptualisations of the digitally programmed bodies of the simulated crowd.

Through the art practice and processes it was possible to create visualisations and materialisations where the organic human body was used as reference and tool of analysis. An unravelling which used a process of re-mediation, translating the digital/virtual into the real, to physically understand the postdigital conditions in which the crowd operates. The aim was to make material the immaterial with a critical standpoint, while making visible the dissimulated articulations and strategies enabled by computational technologies. Various processes and mediums were used in the art practice of this research. Here, specifically investigating the

default character and the postidigital condition of the crowd as can be seen in the solo exhibition Default Characters from 2018.

Spatial narratives such as sculptures and installations were used where ready-mades acted as props, and objects issued from the re-mediated mode of materialising the immaterial, using various techniques and processes such as 3D printing, cameras, sand and metal constructions. Performance here played a central role both live and documented in the films. The performative act can also situate itself in how the audience experiences and explores the work be it in the exhibition space, a theatre or in the urban realm. Performance is also crucial within this research as the human body is both the reference and the tool of investigation. Collages proposing two dimensional compositions on paper acted as comments on the aesthetics of the simulated crowd and more specifically that of the digital tools such as the crowd simulation software, tracking optics and algorithms. Central to this research in practice are the essay films which combine found footage and documentary material with newly shot sequences featuring professional actors or dancers. The films use an associative analysis through their montage editing technique of juxtapositions of images. They also act as synthesisers and have direct relations to the artworks which address the same or tangent topic.

Default Characters, solo exhibition at Marabouparken Art Gallery.

Figure 11 - Installation view of Default Characters, solo exhibition Marabouparken Art Gallery, Stockholm, 2018.

In the exhibition *Default Characters*, 2018, the various artistic mediums and processes that were deployed and combined in spatial articulations immersed the audience into the logic and aesthetics of digitally operated crowds. The visitor literally and physically became part of the show which directly articulated the postdigital, inside and embodied approach, of the practice-based research.

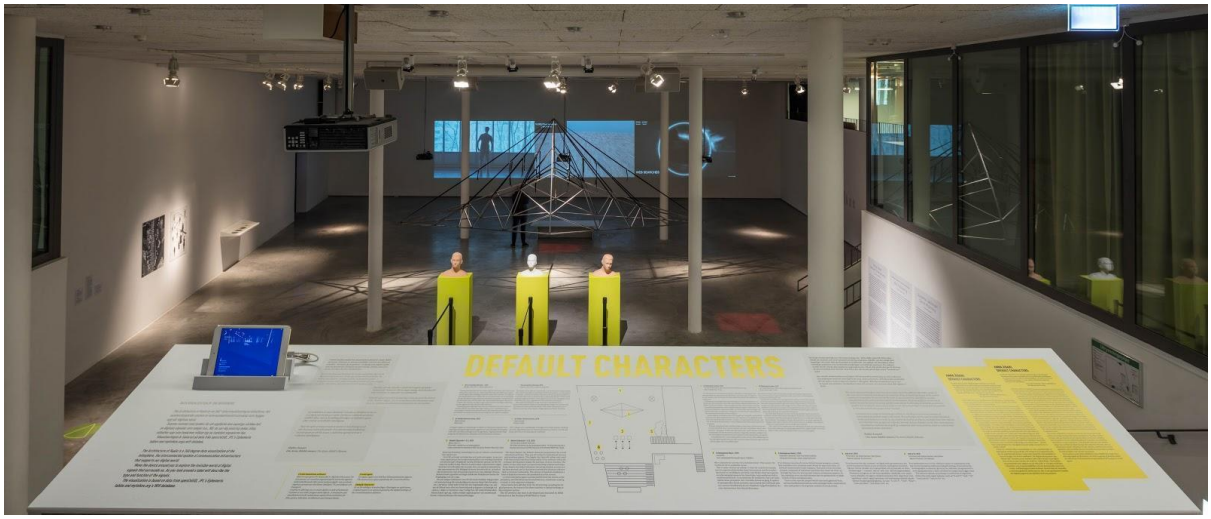

Figure 12- Installation view with outpost of Default Characters exhibition Marabouparken Art Gallery, Stockholm, 2018

The audience entered the exhibition space from above, having a first bird's eye view, an above and overall perspective of the exhibition. Upon entering the visitors could read about the show

from two outposts. The outposts, in the form of two separately located informative board stands, mapped out the exhibition, describing the artworks and related referential texts. Also available was an iPad with the app *The Radio of Architecture* which revealed/visualised the mesh of digital and satellite networks operating the space and visitors.

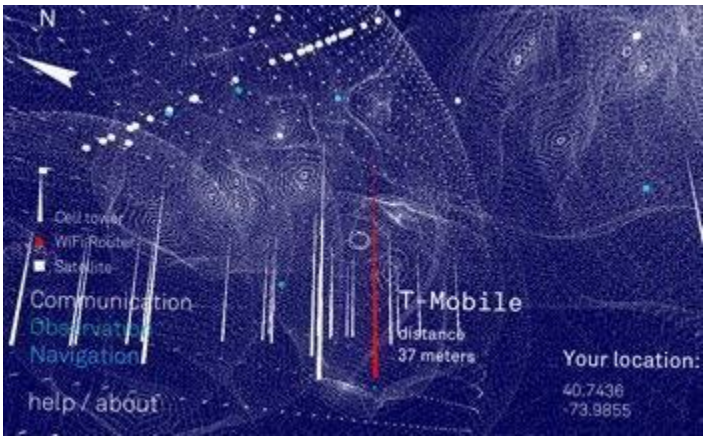

Figure 13- Radio of Architecture.

The visitor was then invited to descend a wide staircase, down into the exhibition, physically entering inside the show and becoming part of the featured crowds and artworks. The show was built around the default character using various mediums and techniques such as film, performance, sculptures, collages and installations. The equation of the combined works/projects (mediums and processes) made possible a subjective diagnosis or analysis of the agency and condition of the postidigital crowd of which they had just become part.

The spatial planning of the show in how the visitors entered from above to then penetrate and become part of the crowd when descending into the exhibition was deliberate in how this research position itself form an inside perspective of the entangled and postdigital crowds. To be able to identify with, and experience the digital condition and infrastructural complexity in which the crowd operates the works were positioned together sharing the open space, dialoguing with each other and with the audience proposing a multifaceted, embodied, material and sensorial experience of the simulations, tracking, surveillance as well as a combination of physical, analogue and digital iterations proposed by the artworks. Hence, proposing from an inside perspective an embodied empirical experience of the research in practice.

Default Characters 1-2-3 (2018)

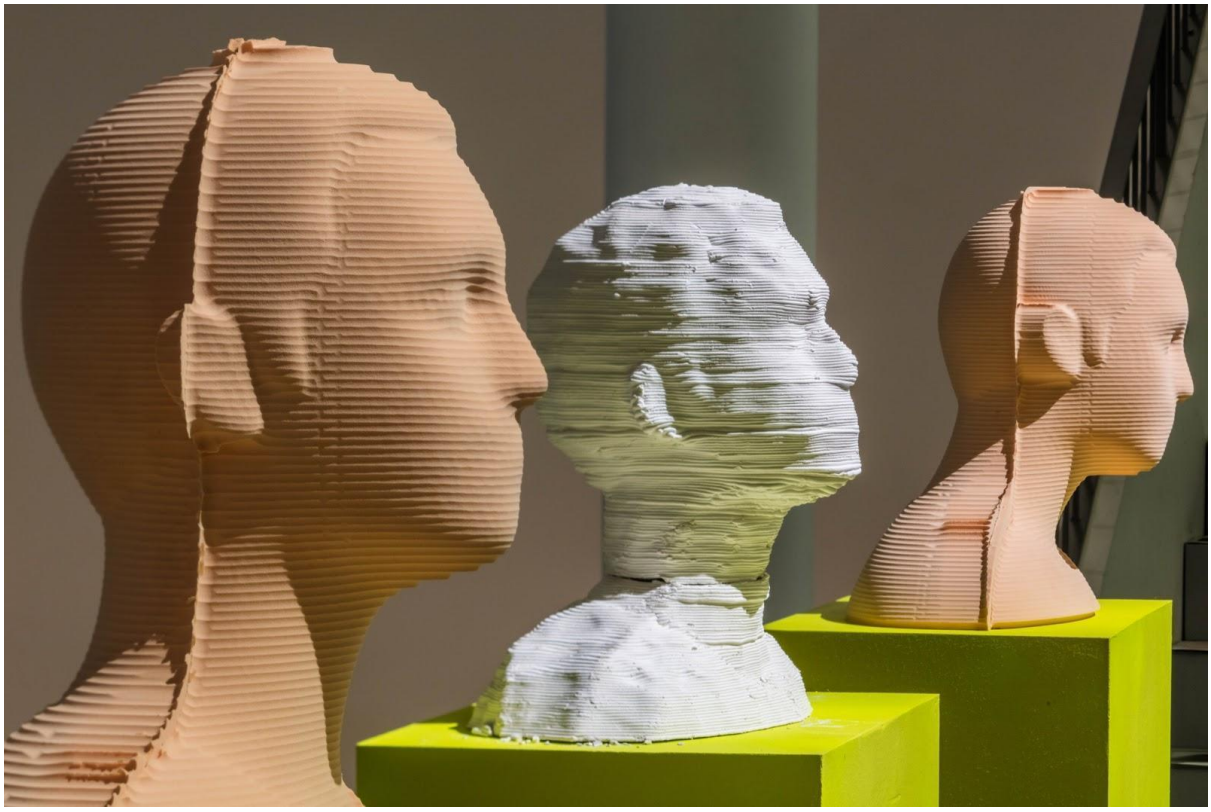

Figure 14 - Default Character 1-2-3.

Features three, 3D printed busts of default agents from the software Houdini printed in clay and CNC cut in polyurethane plastic. The fragile clay will wither and crack with time and the bust will slowly disappear into dust: an analogy of how the featured default character becomes obsolete when imminently replaced by an updated version with enhanced AI and characteristics.[68] The plastic bust on the other hand represents something constant, an imprint in time of how the simulated crowds are digitally portrayed (characteristics and features) while showing the digital techniques available at that precise time and specific version of the software. It is not as much a reference to entropy as it is a reference to the accelerated progress which is today linked to profit and not necessarily to that of science.

These enlarged and 3D printed busts of the default agents from the crowd simulation software enabled the audience to see up close the features and characteristics of the default agents

[68] The clay bust was quite difficult to produce as the technology for printing in clay of that size was not common at the time. A research lab in the north of Sweden, RISE, helped us out as a research/scientific favour but still at a fairly high price.

which composes the simulated crowds. The non-existent mouths show the agents as mute. The busts were made life size and were positioned on high plinths at eye level so that the visitor could stand face to face with the crowd agent whose normal position is far removed into the peripheral areas of a given simulated scenery. A direct confrontation and possible identification with the simulated default agent was enabled. This close up and zoomed in approach goes hand in hand with the perception of the crowd seen from afar as in the project *Homogenous Mass*. Yet, here when brought up close we can see that they are all identical compared to that of a real crowd which is composed of unique individuals. The only thing which differentiates them aesthetically is the posture and the material which was chosen for them to be printed in.

The busts show glitches from the 3D printers revealing the digital gestures, the traces of the flaws intrinsic to default settings in a computer system. Usually, these errors are manually corrected but were purposely left, making each bust unique. The intentionally kept traces of the digital machine were there to make us understand that these busts are purely machine and computer produced. The human hand is only present in the original programming of the software and hardware of the used computational and technological tools. Firstly, these defects as well as the overall aesthetic of the solely digital and machinic production produces an effect of 'estrangement' which aligns with a postdigital criticality.

> 'In the last few years, estrangement became a strategy used by artists engaging with the materiality of digital culture. This may involve the reimagining of 3D printed objects, as the "3D Additivist Manifesto" suggests; the location and exposure offorgotten and eerie territories affected by the development of technology, as is often present in the work of Liam Young; or the creation of infrastructural sculptural formations, like Evan Roth's Burial Ceremony (2015), an infinity loop of fiber optic cables. In all these cases a distancing from the familiar is achieved, one that allows the audience "to stand outside of the world" it is in and to "look back in on it."'
> Daphne Dragona, 2017 [69]

[69] Dragona, D., *What Is Left to Subvert? Artistic Methodologies for a Post-digital World,* in *across & beyond: A transmediale Reader on Post-digital Practices, Concepts, and Institutions*, Berlin: Sternberg & Transmediale, 2017. Edited by Bishop R., Gansing K., Parikka J., Wilk E. p. 194

Secondly it raises the discussion on what is unique, or whether the unique is possible in an era of digital reproduction. This recalls Walter Benjamin's concept of aura and originality/authenticity in 'The Work of Art in the Age of Mechanical Reproduction' and also the idea of what can be defined as making a ready-made unique, within a multiple, in an age of originless digital reproduction. Despite the assumption that mass production generates identical objects, no one thing is, in fact, exactly the same as another – the traces of the 3D printer enhance this fact and portray the digital rationality into the fabric/material of the sculpture.

Figure 15 - Default Character 1-2-3 (2018) life size busts in 3D printed unhardened clay and polyurethane plastic.

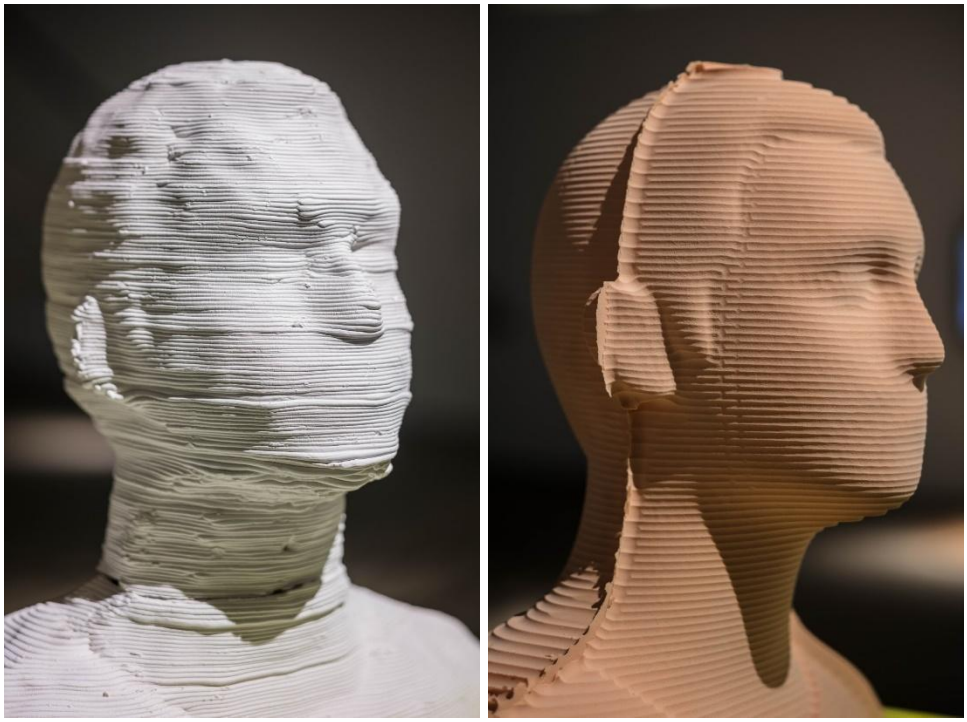

Figure 16- Default Character 1-2-3 (2018) life size busts in 3D printed unhardened clay, left, and polyurethane plastic, right.

The default character in the software is the digital production of the standard crowd subject, but the bust as a form is associated with the portrayal of a person of interest. Traditionally a person with authority such as a regal, a renowned intellectual or academic or simply a very wealthy person.

The default character is not a person of interest. The default character is no one or nothing, just a representation of an average (hu)man, a default agent of the digital crowd performing with others to produce a crowd formation for a utility in a setting where the protagonist is elsewhere. The default character is the lowest common denominator of the crowd simulation whose limited AI and features are intentional, favouring a homogenous appearance and behaviour. A crowd acting discreetly in the background and who are not to interfere with the main character/player or narrative in front of the camera. However, the busts of *Default Character 1-2-3* are doing the opposite. In the exhibition *Default Characters* they were positioned up front, centrally positioned in the gallery space. Presented on bright yellow plinths, unmissable. These three busts became ambassadors or representatives of the

powerless programmed crowd. Brought up front taking a central and frontal position in the exhibition space.

Artist Trevor Palgen's recent work, *Name Standard Head* from 2020, is a 'model head' of a standard, average, man in plaster and larger than life size. This work is related to the average head used for the development of AI technologies such as facial recognition. This head is in a sense in an opposite mode from *Default Character 1-2-3* (which is a fabricated standard head) as it represents a head of many heads, made of statistical human data producing an average head. It addresses the normative problematics of what a standardised head means in the same way as the *Default Characters* but differently. In *Default Character 1-2-3* the heads are the proposed given digital standard. A predicate of what an average crowd head is within a predictive, simulated version rather than a head of many existing real heads and faces. However, together or confronted they would form an interesting proposition on the politics of the concept of the average human as a model for new technologies and computational organisation of the postdigital crowds.

The representation of a population, of the many but here in contrast in its whole heterogeneity and diversity, was in the work *One & Other* (2009), a public performance art project by Antony Gormley, in which 2,400 members of the public occupied the usually vacant fourth plinth in Trafalgar Square, London, for an hour each for 100 days. The project began at 9 am on Monday 6 July 2009, and ran until 14 October. To put a general diverse population on a plinth, taking centre stage was the aim with this project which is in contrast with *Default Character 1-2-3* which presents a standardised model of what that crowd/population should be or appear like to fit into the corporate simulated reality of a crowd.

And or Or, performance, 2018, 4th of May and 16th of August 2018:

In the performance *And or Or* the vocabulary and the grammar of behaviour (based on the so-called 'behaviour tree) of the crowd simulation software default characters were studied and then articulated and embodied by four performers, professional dancers, in space. The intention was to identify the politics and aesthetics of a fully computed programmed – by algorithms and AI – human body which is to act collectively.

Figure 17 - Performance, And or Or (2018).

And or Or was performed in the exhibition space amongst the other artworks. It was also scripted into space through physical elements marked by paint on the floor and projected coloured lights, indicating trigger and target areas according to the behavioural programming of the characters in the crowd simulation software. These indications transformed the space into an activated and scripted location translating the logic of the program into physical space involving the performers but also the audience.

In the performance four professional dancers (Rebecca Chentinell, Pär Andersson, Andrea Svensson, Sybrig Dokter) moved around the gallery space/white cube according to the logic of the crowd simulation software. Their choreography and body language meticulously represented the behavioural vocabulary of the agents proposed by the software, specifically the default agents of three different programs: Crowd FX, Houdini and Massive. When planning for the performance *And or Or* a thorough study was made on several default agents from these software on how they move, their posture and available choreographic vocabulary, consolidating them into a choreographic score, featuring how they are programmed to negotiate the environment and other agents.

Figure 18 - Beginning of performance And or Or, featuring the T-Pose.

At the beginning of the performance the four dancers entered the exhibition space and took the T-pose – the posture of the agent before being programmed. This initial posture, when performed by the human organic body in space, clearly translates that the digital agent is open to be programmed. A body yielding to command.

The performers were then evolving in space according to the negotiative programming such as 'and' or 'or', 'or' or 'or' action, hence the title of this performance. There was an extended focus on the role of the software's own Behaviour Tree (gestural/choreographic catalogue) and programming vocabulary. Here is an example of the choreographic vocabulary of the agents which were used as reference in the performance:

Stand Idle
Walking
Running
Sitting
T-pose
Collapse
Knocked Out
Shot
Walking Slowly
Waving
Jogging
Jump up

Jump Forward	Stand Peering
Sitting Hands on Lap	Stand Twisting
Stand Idle Looking up	Stand Idle Tilted

Not only were the gestures of importance, but how the body presents itself and its limited features: mute, as without a mouth, and eyes that do not see. The simulated agent does not move with gravity which affects the behavioural code and posture, the shoulders and arms become raised as they are not attracted to earth. The virtual realm has no gravity which is one of the main differences to consider when creating digital agents.[70] Another feature of these default characters is that they are primarily programmed to avoid collision, avoid objects and other agents. As the agents do not have a developed intelligence the avoidance of an object or another agent is the same– a non-sensorial nor empathic behavioural code of conduct confirming their non (in)-human nature.

By using professional dancers, who have a skilled and professional knowledge of the body and body in space, enabled a professional embodied analysis and spatial articulation of the digital crowds and in the study of the crowd simulation agent's characteristics. The use of the organic/physical body and professional dancers to unravel the digital agents raises the importance of how physical and psychological intelligence is decisive in the handling and representations of digital crowds.

How many and which dancers to cast for the performance was also of great importance. To create a group which could represent a crowd needed at least four participants[71], a diversity in age, gender and culture defying also male dominance.

Another aspect is that the physical body, here of the dancers but also the audience, comes with its history, traces of life, injuries, incidents and systems. The body is the beholder of its own current history. Hence when choosing the dancers and choosing to do a performance the bodies and the dancer's identity are as important as the performed score. As they represent in their own conferment the contemporary postdigital condition.

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[70] Motion capture, where you scan a body in movement to then enter that corporal data onto an agent in the virtual, have not yet been able to tackle properly this issue but is nearly there.

[71] Four is the minimum to be considered a crowd and escape the symbolism of: one is alone, two is a couple and three is a trinity.

An important aspect of this work is the similarity between the choreographic score and the concept of programming both order the body and 'agent/human' to move according to a set of gestural coordination and grammars in a scripted space. Hence, the performance not only unravels the digital agents characteristics and behaviour in space but also the principle of programming of the human body for collective purposes.

By translating and re-mediating the behavioural codes of the digital agents using physical bodies revealed the differences between the digital and organic. When performing the digital agents in space the dancers embodied their limited behavioural range reflecting their limited AI and abstracted characteristics.

Figure 19 - Image of performance And or Or.

In the exhibition (via the scripted space of targets and triggers) and the performance the audience became part of the logic of the crowd simulation program. When the default character was translated into the human body which was acting according to the given restrictions and grammar of mobility, the agent's silence, muteness and non-communicability became flagrant, the limited gestures robotlike. When the dancers evolved in space

performing the programmed score the public was confronted and aligned with their behavioural code. A contagion (Tarde) effect was noticed amongst the audience. Some members of the public started to move similarly and if not scrutinising their own gestures according to the performed gestures. The behavioural hierarchy between performers and audience was not purely that of the relation between the observing audience and performing bodies, but also of the non-empathic behaviour of the digital agents (as they do not differentiate objects from people/other agents.

The contrast between the human and the default agents became even more evident as the digital agents demonstrate no empathy nor social skills (due to the fact that they avoid others as they avoid objects), just a numbness as atomised from the outside world and others.

At the same time this secluded state and automated behaviour mimics the atomisation that occurs akin to the virtual bubble we move in when glued to our mobile devices in public space. An atomised crowd online as well as in the streets. A phenomenon which has been intensified during the pandemic. That distance becomes, from the perspective of our online lives, a metaphor of how we have become distanced from one another when using our phones in the urban realm. Like the virus repelling us from each other, the distance established by the mobile devices is technical and psychological with an antisocial effect. The robotic aspect of the agent's movements, when enacted by the dancers, divulge the minimised and abstracted gestural grammar of the software. This revealed the aesthetics of a programmed body where the default modes reinforce this abstraction and numbness as they extract the human from the infrastructure of the technology, controlling them from a distance, rather than being an integral part of the machinery. The body is not necessary as a muscular part of the machine but as a biometrical and behavioural data source. The simplified corporal and social language of the agents favours a homogenous aesthetic of the crowd as a whole. At the same time the harvested data digitally augments the predictability of the collective body and behaviour which in turn is modelled to fit the given economic/market or political system.

In this performance work I drew on what Andrew Hewitt calls "social choreographies", linking that notion to score-based techniques in modern and contemporary dance and performance art. The use of scores and reenacted gestures which stems from the post-modernist tradition as, for example, in the works of Yvonne Rainer and Simone Forti which integrates the gestures and narratives of everyday life into the choreographic score. A tradition in contemporary dance

addressing modern social realist topics through gestures and corporal articulations developed in the early 2000 (as in the work of choreographers: Boris Charmatz, Jerome Bel and Michael Klien) in how our gestures can propagate ideologies and a criticality of regimes such as the profit oriented accelerate society and bring forward the beauty and joy in the people whose bodies are not fitting into these systems.

I also adhere to the critical investigations into postdigital modes of embodiment and power relations in the performance works of for example Alexandra Pirici *(Monument to Work)*[72] and Anne Imhof (*Faust*, 2017)[73], but where their works focus on industrial/economic labour regimes and social media attitudes, my performance works focus on the postdigital condition of the automated crowd subject.

[72] *Monument to Work,* 2015, was a memorial performed by people in motion. It is based on the movement patterns of factory workers, from the 1970s to today, and focuses on the working body in the transition from industrialism to a post-industrial economy. *Monument to Work* is produced by the Public Art Agency Sweden and is presented in Stockholm in collaboration with MDT.
[73] An example is the performance *Faust* which was presented in the German pavilion at the Venice Biennale in 2017. The performance used a fashion oriented aesthetics of the young and trendy and with references to the dominance and control of social media which produces hierarchies and insecurities in social and human relations. The latter is not a phenomenon I address or focus on in my research as I am not looking at the social media and crowds as communities but rather larger political and structural issues of the (globalised) digitisation of crowds and the linked technological infrastructures and techniques.

The essay films *Default Character* (2016) and *Di-Simulated Crowds* (2018)

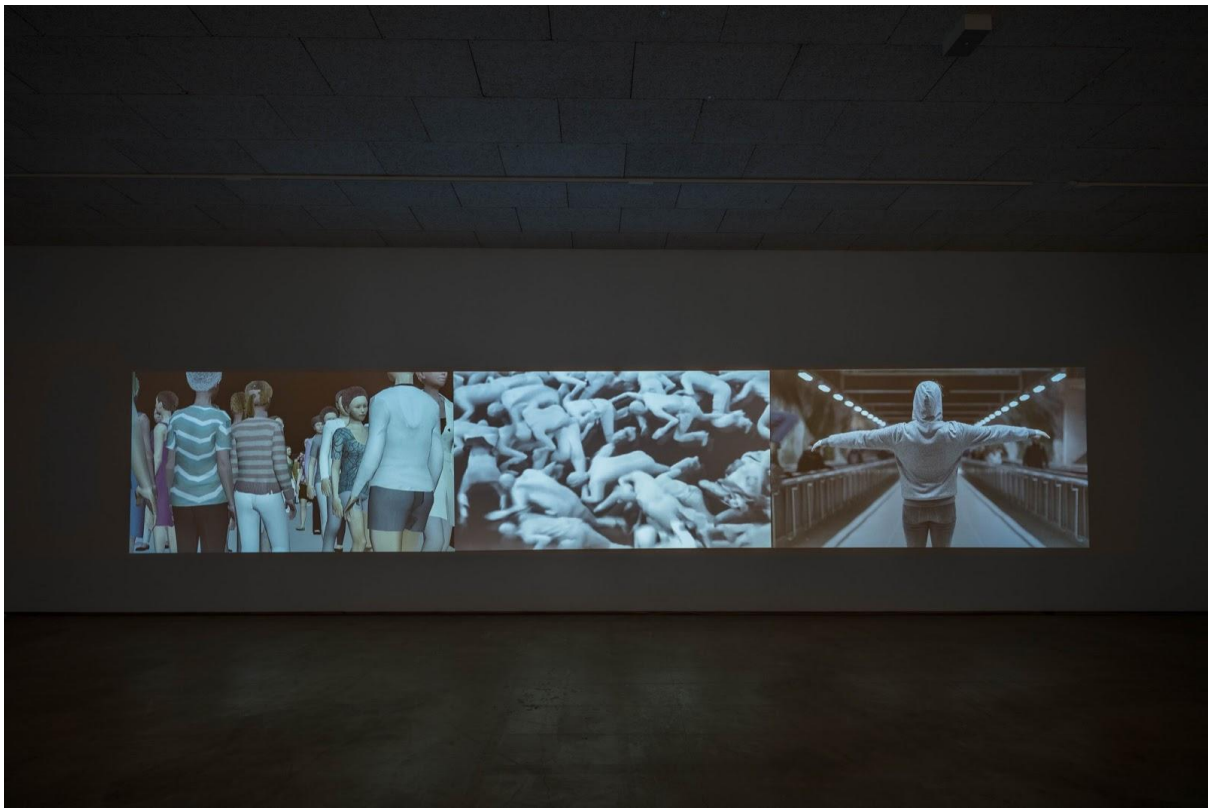

Figure 20 - Di-Simulated Crowds (2018), installation view at Marabouparken Art Gallery, Stockholm.

Default Character and *Di-Simulated Crowds* are both essay films where found footage is woven together with newly produced images featuring professional actors or dancers. The soundtrack uses sounds from the found footage clips, remastered and edited, combined with an analytical and observing voice-over. The films focus on the vocabulary, tools and human representation in crowd simulations software and optical tracking systems. The films use an associative analysis through their montage editing technique of juxtapositions of images. They also act as synthesisers and have direct relations to the artworks which address the same or tangent topic. An example is that of the film *Di-Simulated Crowds* (2018) which was shown with other works in the solo exhibition *Default Characters* at Marabouparken Art Gallery (2018). The soundtrack permeated the whole space and became not only the soundtrack of the film, but the soundtrack to all the featured works of the show.

The films include clips, found online, from showreels and tutorials of the Crowd simulation software's such as coordinated swarms, mass body crushes, campsites and religious gatherings. These examples are juxtaposed with images from human tracking devices in urban space and scenes of gestures and postures drawn from the simulated crowd agent performed by two dancers (Rebecca Chentinell and Pär Andersson).

Default Character was the first filmic project within this research and was premiered at the Whitechapel Gallery in November 2016 within the context of an event around my film works and research. *Di-Simulated Crowd* was made a bit later in early 2018 and in another format, a three channelled film and installation in a horizontal triptych format. The film is a spin-off, or rather evolution from *Default Character* with new findings and developments in the research. Both films address similar topics, but with different formal and embodied approaches. *Di-Simulated Crowds* allows for a large monumental projection. In the exhibition *Default Characters* the film was dominating the room and the clip featuring the dancers, re-enacting the default characters behavioural choreography became life size in space, hence producing an effect of mirroring or interacting with the audience in the exhibition and the performers during the performance *And or Or* (which took place in the gallery space). The triptych format as well as the editing process of montage of the film, allows for a visual analysis of associations and juxtapositions. The identification with the images and the dancer re-mediation of the digital crowds becomes physical, nearly palpable. Compared to *Default Character* in *Di-Simulated Crowds* the relation between the crowd simulation images, their aesthetics and politics, (purposes and use) are further developed confronting and linking them to the optical tracking systems and surveillance capitalism. It also includes newly shot images of dancers (Rebecca Chentinell and Pär Andersson) enacting and unravelling the behavioural and choreographic characteristics of the default agents. The re-enactments are performed in a focused manner in a studio environment as well as in the urban realm, such as the underground,where the default agents programmed body interact with the people going about with their daily habits.

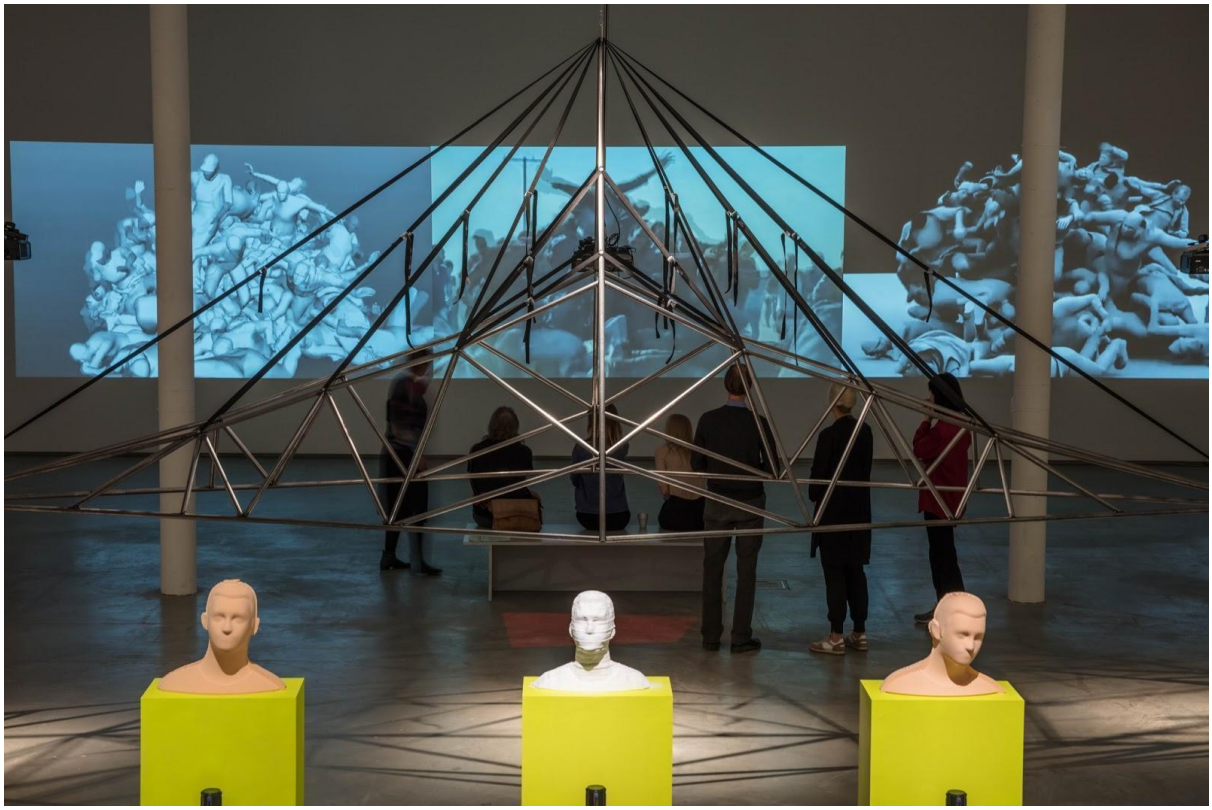

Figure 21 - Installation view of Default Characters exhibition at Marabouparken Art Gallery, 2018 with Di-Simulated Crowds on the far back.

As mentioned earlier, I discovered early on, clips on Youtube showing the mesmerising mass choreographic images which were put online by the crowd simulation software companies. The homogenous rational imagery they depicted was striking in its inhumanity.

The clips not only featured perfectly organised coordinated swarms but also zombie crowds piling up on each other like ants or people in war zones running frantically towards their death.

Default Character (2016) and *Di-Simulated Crowds* (2018) both open with a clip of a crowd crumbling towards the camera. Step by step it is revealed that the crowd is made of CGI (digital produced humanoid agents). The last clip of the sequence shows the simplified grayscaled agents without heads. Heads are unnecessary in how the simulated crowd needs to be calculated to be produced digitally as a moving image. Even though this sequence does not represent the default character, it sets the tone and understanding of how simulated crowds are considered when to be created and programmed in a software, or managed in the real: a crowd with no gravity where heads are superfluous swarming as a flock of insects or

animals. Hence, it is obvious that this crowd is not made of real humans with a complex intelligence and individual agency.

The films move on towards the presentation of the default pedestrian in the crowd FX program. The woman´s voice from the tutorial presents him as follows: 'He is a low-res polygon mesh guy all set up for you to use´. A male agent proposed by default and being a default version of one. When selected he appears in a T-pose posture, available to use and ready to be programmed. The fact that the default agent is predominantly male in all available software has been raised in this chapter. Consequently, to address and balance this gender biased default crowd there is a newly produced sequence portraying a crowd made solely of women[74].

The image of the human male, his features and characteristics and the vocabulary describing his total availability describes, even if it is just a 3D model, a human as slave. He is then programmed to act in the crowd with other agents collectively. The woman's voice continues to describe how the agents will be programmed to be activated by triggers and moving towards goals as if attracted to a magnetic force. The image given to us is that of colour coordinated synchronised bodies moving synchronically fills up the screen. People acting as a flock, a kettle of humans. We then see how digital crowds can be spread on an empty beach to populate a festival. In another software a square-shaped crowd is bulldozed and slayed by a huge wrecking ball with spikes, throwing the lifeless bodies around, only to be followed by another example of an interaction with a giant snake shuffling more lifeless bodies around as disposable bricks on a plate. These examples are described by the software Miarmy as 'Arbitrary Shapes Based Dynamics. Any Maya object, 3D modulate object, can be marked as Dynamics Object Interactive with agents'

[74] The clip was made with the help of Maybelle Peters at the RCA computer lab, see left image in figure. 27 of installation view of *Di-Simulated Crowds* at Marabouparken Art Gallery.

Figure 22 - Still of Di-Simulated Crowds featuring the clip to the left with the 'Arbitrary Shapes Based Dynamics'.

There is also a behaviour, 'ragdoll', which can be applied on the crowd in the 'Behaviour tree', where the body of the crowd agent becomes lifeless. All these images depict a powerless crowd.

Crowd simulation software is often used to generate zombies or battles in films, where the crowd is to be slayed or dead. The same software is then used for crowd management purposes or crowd safety, to protect life. Hence, a dichotomy in how humans are to be represented and organised by computational operations.

The use of the found sequences and clips of showreels and tutorials from online platforms of crowd simulations and multi-target tracking system contextualise the films within the use and purpose (who uses them and for what purpose) of these technologies, rather than within a personal creative framework. What we see is that the crowds are there as cost effective props to be smashed or killed.

This crowd is without real human value but is rather a hollowed-out representation of a crowd without the spirit of one – without collective agency or sense of autonomy.

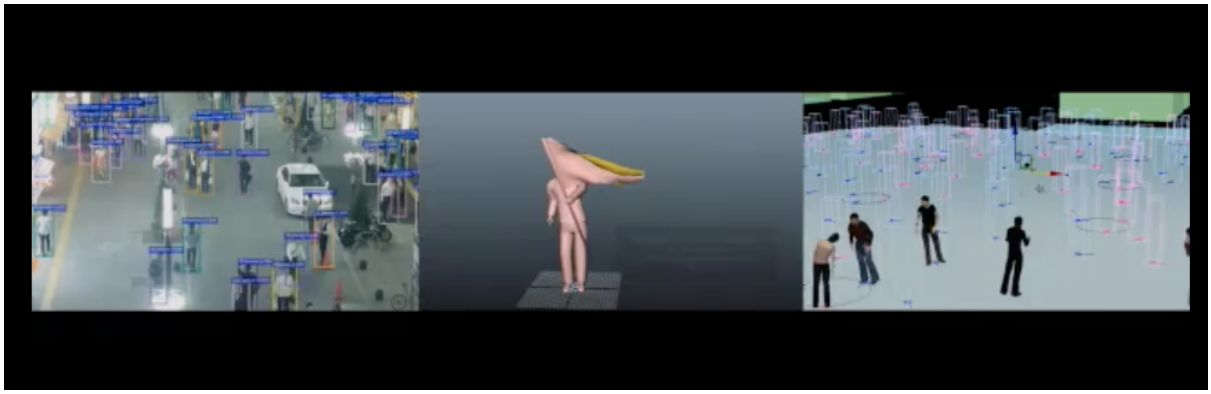

Figure 23 - Image, Di-simulated Crowds.

Both films use the editing process of assemblage which allows for an associative visual analysis. An analytical editing process in the spirit of Farocki and Godard, as well as according to the logic of Aby Warburg's *Mnemosyne Atlas*, where an image informs and analyses another image by juxtaposition. The montage editing technique used in the films draws from the works of Farocki and Godard but also from Chris Marker and Hito Steyerl. Hito Steyerl is a precursor in the critical investigations on the postidigital and the digitalisation of society in general. However, in her editing technique she uses a tune (or a song) which frames and sets the tone and narrative to each of her films. This is a recurring format in her practice which sets her work apart from the other artists I mentioned earlier when it comes to the montage editing and essayist film format I adhere to.

In *Di-Simulated Crowds,* which is a spin-off from *Default Character,* which include more researched material and observations is a three channel film (which can be exhibited as an installation), in a triptych format, the image sequences are positioned next and simultaneous to each other. The juxtaposition of the three sequences, within the triptych format of the film, allows for an ongoing associative analysis. As the eyes wander from one sequence to another there is a subjective editing, selection process, which is made by the viewer on top of the one proposed by me. The audience can, not only by observation but also physically, enter and exit the exhibition space and works adding another interactive editing layer of the perceptions and encounter with the works and featured crowds. This subjective viewing proposes an immersive, embodied/active and engaged experience especially when the film is shown in its intended large format where the dancers become life size.

Figure 24 - Installation view of Di-Simulated Crowds with performers in front.

The identification with the images of the dancer's re-mediation of the digital crowds becomes physical, nearly palpable. This allows for an embodied understanding of the analysis of the proposed images of the simulated and tracked crowds. The common denominator between the images remains the human body, in its natural, performing, tracked and simulated form. An articulation which allows the viewer to identify with the bodies forming the featured crowds. Compared to *Default Character,* in *Di-Simulated Crowds* the relation between the crowd simulation images and their purpose is further developed, confronting and linking them to the optical tracking systems and surveillance capitalism, while utilising more newly shot images of dancers enacting and unravelling the behavioural and choreographic characteristics of the default agents of the crowd simulation software. Even if the NPC´s (not featured in the film except in one short clip) have further developed behavioural patterns, gestural catalogue, voice and possible interaction the simplified gestures do represent them as well in their abbreviated and limited characteristics.

The juxtaposition between the crowd simulation images with the tracking systems and the human body of performers/professional dancers enacting the posture and choreographic scheme of the digital agents produce confrontations and associations. A juxtaposition which reveals, through difference, the mathematical characteristics of the crowd simulations' rationalised behaviour and that of the human body's complex nature and inherent irrational behaviour. One example is the directive of 'avoiding collision' where the agents are programmed to avoid each other as they would avoid an object, with no empathy, not

recognising the human characteristic of the other agents. This attitude portrays a crowd with no solidarity or contact. There is no bond between the agents except for that of synchronised movements. A common, motion-driven direction orchestrated by triggers and targets, proposing a common dynamic and flow, but not a common agency driven by a social consciousness.

Several artists have used crowd simulations as topic and subject such as in the interactive performance project *Emergence* by Universal Everything[75] where a crowd is operating according to an individual, which is the avatar of a player (human). The avatar moves and the crowd mimicks and follows the avatar and his behaviour and gestures. The choreography of the crowd is swarmlike and encircles the avatar in a frightening yet fantastical and mesmerising way. This work addresses collective behaviour and crowd aesthetics, yet it is in total contrast and opposition with how my research addresses the crowd from within as a member of a collective. The relation between the individual and the crowd as featured in *Emergence* is that of a homogeneous mass of followers or that of a threatening mob. The hierarchy is clear between the leader, the player, and the mass of followers. In both cases the depicted crowd is not a heterogenous crowd made of singular subjects with agency rather a crowd as flock without any humane, social or political consciousness. In other works with crowd simulations as in those which can be seen in the artfilms by Jon Rafman (whom I have exhibited and been programmed alongside a few times) the crowd is more of an organ(ic) biological nature. Aesthetically similar and assimilated to that of internal organs, similar to pink entangled intestines where the crowd operates as a wormlike mass of agents. In other works of the same artist the crowd is even more anonymous and homogeneous and used as props in the zombie ragdoll effect where they are played with until their collapse or death. In both cases the crowd is not portrayed as a crowd of sensible and intelligent humans with feelings but rather as props or guinea pigs used to toy around with the functions of the crowd simulation software. The work presents a crowd of humans acting in non-human ways, both physically and psychologically, and hence shedding light on the problematics of the type of crowd the software generates, or makes possible. Yet again the crowd is created by identical default agents viewed from a distance without any possible identification. The criticality lies only in how far the crowd simulation software allows to degenerate the nature of a 'real crowd of humans'.

[75] Presented by Within at the 2019 Sundance Film Festival.

In 2018 I was contacted by the artist Clemens von Wedemeyer who had seen *Default Characters* (2016) to inform me that he just made a film *Transformation Scenario* addressing the crowds and crowd simulations using some of the same clips.[76] This was just after I had finalised *Di-Simulated Crowds* also on the same topic. However, his interest is not within the academic framework and is principally anchored in Canetti's writings and film, with its relation to the shifting role of extras or digital representations of political crowds, or protesting crowds, such as the rioting crowds in Leipzig in 1989. The common interest here was not only of the crowd simulation imagery generated by new technologies, but that we both have addressed crowds and crowd behaviour, in our art practice, from different time periods from a critical and humanistic perspective.

Hence, this research and film's specificity is the critical interest in crowds and the digital, inseparable from each other.

Locomotion Diamond

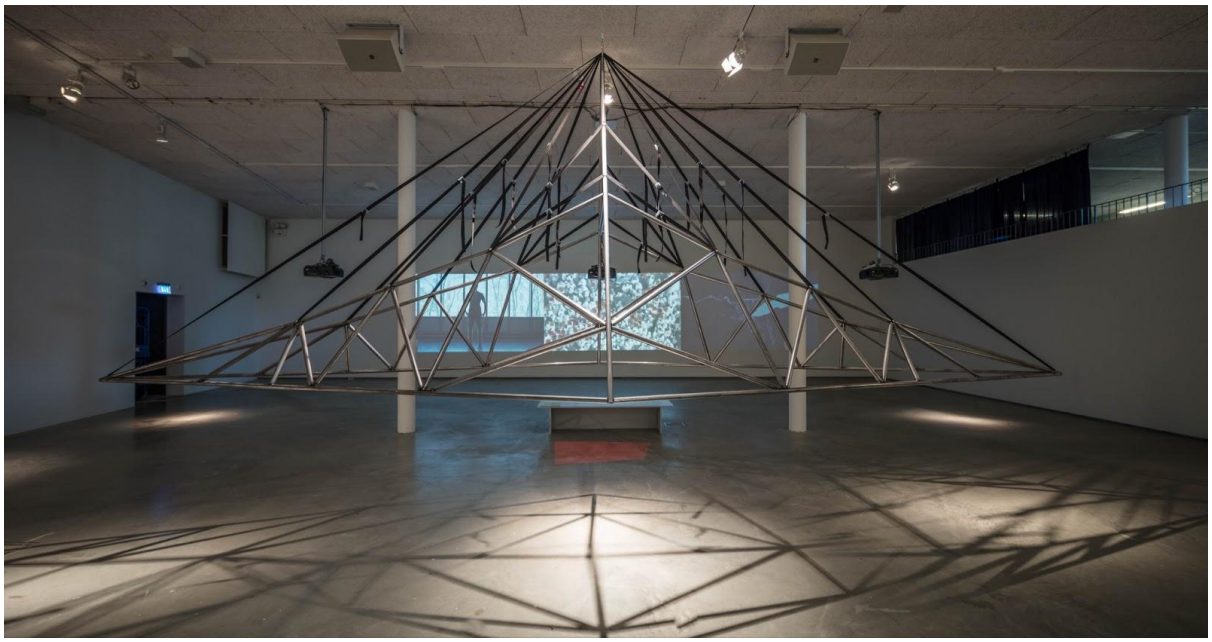

Figure 25 - Installation view of Locomotion Diamond (2018) in Default Characters exhibition.

[76] This was just after I had finalised *Di-Simulated Crowds* also on the same topic. This common interest led to some private and formal discussions/lectures and talks (*Invisible Crowds*, Freier Universität Berlin, 2018, film study department, organised by Prof. Volker Pantenburg) and exhibitions (*A Crowded Sky* at Impakt and *MASS* at Pylon Lab) we both participated in, on and around crowds.

The 7x3m sculpture made of metal and strap bands is a translation and remediation, from the virtual 2D image of the diamond-shaped icon in the CS software representing the crowd agent's motion and velocity.

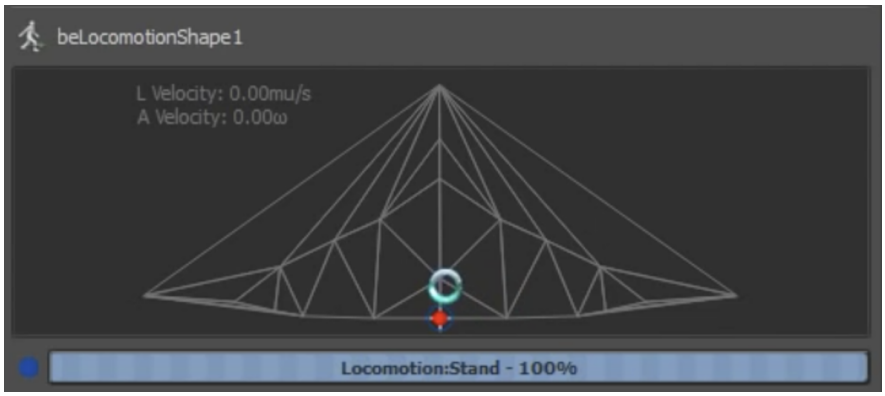

Figure 26 - Image of diamond shaped velocity controller in the Goalem Software.The higher up the little blue circle positions itself on the diamond, the more aggressive and dynamic movement of the crowd agent.

This representation, of a simulated human in motion, in the shape of a pyramidal diamond composed of triangles (the top ones representing the most aggressive and fastest movement) is of interest as it is a mathematical, digital, translation of a body in motion through the logic of the software. When extracted into the static sculpture, the metal became the sedimented skeleton and the strap bands the tense, permanently flexed muscles. This diamond triangle epitomises the rationalisation of the body in motion when translated into a geometric figure, a mathematical organisation of the dynamics of the crowd. It schematises both movement and affect as the more dynamic and aggressive the motion of the crowd subject when the controller/cursor is set at the top of the triangle. It also encapsulates in its geometric triangular shape an image of total control over the crowds' mobility and physical agency.

The sculpture in its large size of 3x7m, and central position in space, became a monument of reverence to the digital collective body in motion, but in a state of immobility. The lines of the metal and strap wires extending into the space and their shadows reaching even further out onto the floor reminisces the constructivist aesthetics, as seen in Moholy Nagy's and El Lissitisky's work of people appearing in drawn lines and geometric configurations portraying the organised relation between human and technology.

In the exhibition *Default Characters,* the sculpture hung from a single metal thread from the ceiling. A suspended body, centrally situated, dominating the space. This demonstrative, and monumental articulation positioned the politics of the tense body of the postdigital crowd

subject at the centre of the exhibition and prominently positioned to mingle in the perceptual apparatus of viewers, thus keeping it at the forefront of their minds.

In-Visible Infrastructures

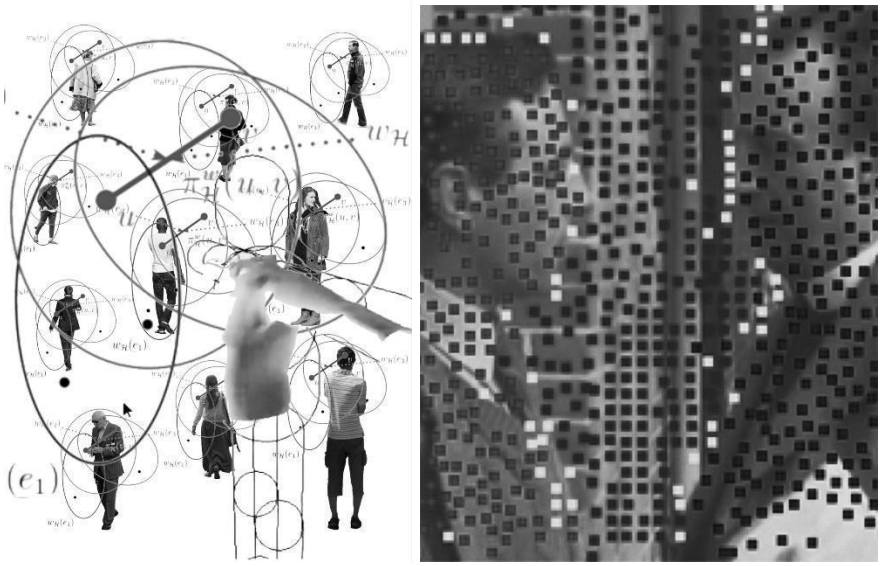

Figure 27 - Collages 1 and 2 of In-Visible Infrastructures series (2018).

These digital collages are assemblages composed of details from crowd simulation software imagery such as the T-pose posture and body fragments but also tracking and surveillance images as well as the multi-target tracking algorithm. One example is the optical flow which is a particular tracking system used to detect and track crowds in an image sequence captured by a camera.[77] Optical flow methods that use differential techniques are based on the hypothesis that the brightness of a moving point is constant over time. In order to calculate optical flows, a lot of algorithms[78] are used. The system detects crowds with different shapes and motions, and tracks them over time. The output of the system is given as a graphic overlay, i.e. arrows and

[77] "Crowd Analysis by Using Optical Flow and Density-Based Clustering" paper by Francesco Santoro, Sergio Pedro, Zheng-Hua Tan and Thomas B. Moeslund. Department of Architecture, Design and Media Technology, Aalborg University, Denmark.

[78] e.g. the Horn-Schunck method (a global method which introduces a global constraint of *smoothness* to solve the aperture problem) and the Lucas-Kanade method (which assumes that the flow is essentially constant in a local neighbourhood of the pixel under consideration, and solves the basic optical flow equations for all the pixels in that neighbourhood, by the least squares criterion).

circles with different colours are added to the original images to visualise the crowds and their movements.

The collages address the aesthetics of the tracking and simulation tools and how these tools operate the crowd through mathematical logics, where the geometric forms, which are prominent in the collages, are used to organise and model the crowds make this relation evident.

The printing of these digital images onto paper, and specifically a series of collages which were printed on a scroll of Japanese paper made according to old paper making tradition, signalled an interest and reference to the analogue material and ancient craft tradition as a counterpoint to the image it supports. But also as a permanent imprint in time. One of the collages was made into posters available for the visitor to take. This analogue format of a poster in a multiple yet limited edition available for free plays with the virtual image and its endless reproducibility (discarding the NFT trend). Here again the merge between the analogue and digital in its aesthetic representation reminisces the postdigital approach.

The poster features two men where the graphic overlay, of the optical tracking system, of multitudes of squares dissolve, as in a pointillist painting, their features when seen up close. There is an oscillation between the macro and micro. A dual perception which can be put in relation to the inside and distanced perspective articulated in *Homogenous Mass*. In a natural state the features of the men become clearer and more defined as approached while the digitised image of the same men dissolves their features and identity. This perception of disintegration can also be seen in the films *Di-Simulated Crowds* and *Default Character* where the simulated worshipping crowd circling around the Kaaba dissolves into pixels when zoomed in. Here the digital technique does not allow to penetrate and identify the subjects of the crowd.

Homogenous Mass

Figure 28 - Installation view Homogenous Mass (2018).

Homogenous Mass is an installation composed of locally gathered sand and a macro photography camera which is connected to a screen.

The sand was laid out on the gallery floor with a macro camera filming the sand up close. The zoomed-in image was then live streamed on a screen positioned on the wall.

The installation was an articulation in space of the inside perspective used in this research addressing the traditionally distant perception of crowds. It also refers to the particle logic sometimes applied to crowds in simulated and virtual representations. It proposes a dichotomy between the heterogenous organic crowds versus the homogenised programmed uniform entities (digital particle formations). Foremost the installation proposes a conceptual approach used on a macro-micro articulation: when seen from a distance we understand the crowd as a homogenous mass where the individual identity of the sand grains vanish. However, through the camera which proposes a zoomed in macro view, you can clearly see that the sand is made of grains varying in colour, size and shape. The installation proposes an image with two views: the micro view proposing a homogenous mass and the macro view of a heterogeneous crowd made of diverse entities. A dialectic between two views proposing two perspectives and ideologies of how to understand and perceive a crowd. A reminder of how easy it is to distance

yourself from the people forming the crowd when seen and operated from afar where the complexity of the subjects comprising the crowd is disregarded in their complex aesthetic, human beauty and politics.

For this specific exhibition the installation used sand amassed from the nearby surroundings of the Art Gallery and therefore contained traces of the local population and sediments of their habitat, enhancing the particle image of not only sand but of people, the crowd and urban life.

Conclusion: The agency of a crowd in default.

This chapter has contextualised the crowd historically and theoretically, addressed the simulated crowds of the crowd simulations and the interactive simulated crowd of the computer games while giving a brief insight into the aesthetics and politics of the tracking and surveillance tools of crowds and collective behaviour. What has been identified in the perspective of how the crowd is operated and represented in these various instrumentalisations, is that the crowd is still considered, managed as a mass lacking individual intelligence and agency (Le Bon, Freud). A crowd which, to be operational, needs to be rationalised to function as an image of a crowd but without having the identity of one. What has also been addressed is the importance of the symbiotic relationship between the organic and digital crowds. How their future co-existence and agency can articulate itself within a (western) market based digital world. A co-existence which adheres to the postdigital condition of today´s crowds where the digital and analogue is merged and everyday life is permeated by the digital/computational. A position which allows for a criticality and disenchantment of these technologies. Hence, a criticality which brings forward an urge for more awareness of how these technologies are governing us, the crowd, and what agency we have and can exert.

With the development of AI and machine learning the emancipation and agency of the digital crowds can take a new autonomous turn if governed by a democratisation of data and democratic rule or influence. In this specific case the data which will feed this AI and what purpose it is programmed for will determine the politics of those crowds. However, there seems to be an interest, from a monopolised market/market perspective and authoritarian governments, in keeping both organic and digital crowds in a controlled state, rationalising their collective behaviour.

This chapter has addressed both in theory and in practice how default settings and options are impacting on the crowd. It explores how they are put in a position unable to see and understand the technologies operating them while altering their movements and behaviour. By using default modes the crowd becomes a homogeneous collective body more easily operated and controlled while being progressively depleted of agency.

The practice's various methods and processes: the analytical associative montage editing in the essay films (*Default Character*, 2016, *Di-Simulated Crowds*, 2018); the corporal transmediation and translation of the body in motion to a metal and strap sculpture as in *Locomotion Diamond* or into 3D printed, life-size, busts in clay and carved in polyurethane where the traces of digital production was kept as 'estrangement' and signalement of the postdigital condition; the simulated and programmed digital crowd subject which evolved into the exhibition space and amongst the audience as in the performance *And or Or* as well as a proposition of a method and position of perception as proposed by the installation *Homogeneous Mass*. These various articulations in space, featured in the exhibition *Default Characters,* acted together in a combination of conceptual and material experiences of the default characters, while acting as a reflection of the subject/self and the audience, as a standardised programmed/digital mass. The show proposed an experience of knowledge, using several sensorial, spatial and material experiences of the practice via the artworks. Yet, the autonomy inherent to art was kept in its possible subjective reading.

As referred to in the previous chapter the repetitive, so called, 'loop' of the feedback system which has its origin in the adaptive systems of cybernetics (Wiener) is slowly establishing new habits gradually shaping our gestures and behaviours. Recently there is an increase in awareness amongst the crowd of how technologies are used upon them, but no no real proposition of how to gain agency in relation to the dominant monopolistic manufacturers operating the crowd. We, as part of the crowd and as users, can select what cookies to use while surfing a page. On a more structural level the GDPR legislation, and the new EU law against misuse of AI is working towards some kind of regulations. Yet, it is far from achieving a shared, democratic control of who and how the computational tools are deployed and for what aim.

We are put into a position where the manufacturers laying aside the political regimes here) are managing in detail our (constructed) needs and hence our behaviour. The operation of our, the

crowd's, behaviour through default settings and automated systems and options can be likened to a manipulation or hypnosis where our gestures are not made by our will or rational decisions but automated by the user-friendly environment/interface of the technological devices and apps. Which when used daily are slowly transforming our habits and gestures without us realising it.

> '… the individual finds himself in the hands of the hypnotiser. The activity of the brain being paralysed in the case of the hypnotised subject, the latter becomes the slave of all the unconscious activities of his spinal cord, which the hypnotiser directs at will. The conscious personality has entirely vanished; will and discernment are lost. All feelings and thoughts are bent in the direction determined by the hypnotiser.
>
> He is no longer himself but has become an automaton who has ceased to be guided by his will.' Le Bon, 1895. [79]

To operate the crowd online according to the logic of the hypnotiser, that the anti-democratic and conservative view Le Bon proposes, becomes problematic when considering the ethics and morals of how technologies are applied today. Through our smart devices collecting behavioural data, panopticism occurs in a new form. When we become more conscious of how much we are being surveilled, tracked and analysed while mapped through our mobile devices whilst giving away data on ourselves. An increased awareness of how we act and behave can modify our behaviour. We will not only try to gain agency over the systems and techniques but we will be more conscious of how we use them. Even worse we will scrutinise ourselves and discipline ourselves, and our collective behaviour will be altered, our gestures predetermined and maybe even self-programmed. 'He who is subjected to a field of visibility, and who knows it, assumes responsibility for the constraints of power; he makes them play spontaneously upon himself; he inscribed in himself the power relation in which he simultaneously plays both roles; he becomes the principle of his own subjection' (Foucault, 1977, p.202). It is not that we have to go back to a non-technological environment but that there needs to be an ethical behavioural code for the manufacturer, a transparency and at the same time an informed

[79] Le Bon, G. (1895) *The Crowd. A Study of the Popular Mind*. 2005 edn. USA: Filiquarian Publishing, LLC. p. 23

awareness among the users of how these technologies are operating without users having to understand all the technical details.

The current development of AI and machine learning proposes an even more complex automation which engenders a transmutation of our daily habits and gestures. Yet we have to remember that the original programming of these systems/AI is by a human. Human logic is at the basis of all computational programming and intelligence but is increasing in complexity when the AI are automated and progressively autonomous in their self learning systems (machine learning and deep learning).

Within this prospect there will be a gap between the professionals which are part of that development and the crowd which by default options will be extrapolated from those systems. The power and control lay in the hands of those with knowledge and power over the intelligent driven technological systems which are governing the crowds.

In neuroscience, the part of the human brain which is named Default Mode Network is initially assumed to be most commonly active when a person is not focused on the outside world and the brain is at wakeful rest, such as during daydreaming and mind-wandering. However, it is now known that it can contribute to elements of experience that are related to external task performance. It is also active when the individual is thinking about others, thinking about themselves, remembering the past, and planning for the future. The default mode network was originally named as such due to its mode of inactivity and escapist nature, as if the brain was disconnected (Buckner et al., pp.1-38).

Here, to be in a default mode was proven not to be inactive but active when we become empathic and emotional. Even if these modes are not directly linked, there is a beautiful speculative connection to be made. We can be 'defaulted', rationally and algorithmically but hopefully it means that it will not definitely shut us down or confine us to a passive state if we are to act in solidarity. Following this logic a collective gesture consolidated by a peer-to-peer system in an organised form may enable the crowd to find agency using the computational systems at hand.

Most often we choose the default options in a moment of stress or urgency to be able to fulfil or pursue the given task. Default modes are linked to our accelerated modes and operations as they enable a faster and easier use of computational tools. Default is also linked to the

complexity of these tools and proposes an alternative smoother navigation of our digital contemporary life.

In both cases the default modes and options have an effect on our behaviour. Our gestures become abbreviated and standardised through the default shortcuts.

These shortcuts enable an accelerated navigation, while the data harvested updates the software and the bodies using them, boosting the velocity of the flows of performativity, consumption, production and information. While the programmed/organisation of avoidance of each other in the management of crowds in urban space and in the programming of simulated crowds enables a preserved flow. Hence *the defaulted crowd is that of flows.*

Ch.3: Flow

Figure 29 - Still from The Power of Flow. The Flow of Power (2020).

We all want flow, to be in the flow. Where we are in balance with ourselves and with nature. When in a concentrated mode aligned with our thoughts enabling a sharp and critical mind. During the pandemic, which has been an enormous distraction, a mental and biological threat while imposing social starvation, the concept of being in the flow is even more enticing.

However today that flow that we are aspiring to has been captured by the economy and linked accelerated society.

Today the word and notion of flow is everywhere, attached to any brand who wants to sell anything. Flow has become a stamp for efficiency and success in the marketing strategy. Another tool used by the corporations to subvert the crowds using the self-belief system. An optimised self-empowered and self-realised you.

This phenomenon is flagrant in how the flow is depicted in commercials.

> "Everybody keeps talking about flow, dude, but what does this flow even mean?"

In a Puma ad two football fans are sitting in a kebab restaurant with the tv on in the background showing a football game. One of them is commenting on the game by exclaiming "Oh man! This player has such flow!" His friend seems puzzled and asks him "Everybody keeps talking about flow, dude, but what does this flow even mean?"

A cavalcade of clips follows, featuring the player skillfully dribbling, doing tricks, strategising and scoring while doing selfies for his instagram updates, interlaced with images of cool music video choreographies as well as famous football players. The accelerated montage portrays a person who is on top of things, a winner with supreme skills, physically and online superior while being zen with his family. The advertisement ends with the friend finally answering "That's flow!" followed by the slogan: This is my flow!

What the audience is to understand is that to have flow is to be the super-self you, and with Puma, you can buy it.

The vocabulary and notion of flow can be found everywhere today: in our current economics, crowd simulations, online relaxation modes, in the operations of biometric scannings and trackings as well as in today's human flows of refugees. This chapter addresses these different and common occurrences of the term 'flow' to achieve a better understanding of how the notion of flow has been instrumentalised into the governance and monitoring of crowds favouring political and economic strategies. How the crowd's organic bodies, creativity, production, performativity, economy, and online modes have been hijacked by our accelerated and market oriented society. Hence, how this hijacking which puts the crowds into constant motion consequently suppresses their agency producing a collective spirit of self-propelled flow followers.

In the *Oxford English Dictionary* flow is mostly defined by physiological and ecological references and definitions of liquids and their movements.

Nevertheless, to find a more accurate definition of the widespread, prevalent, use of the term flow the Urban Slang Dictionary online gives a somewhat appropriate description.

In urban slang, flow has multiple meanings. You can have it, not have it or you can go with it. To have flow is to be able to rap in a specific fluid manner, mastering the stream of words and narrative exiting your mouth. To not have flow means you are broke. Hence to have flow is to

have money. To go with the flow is to stop worrying about time, money, material possessions, but instead, relax and take life as it comes.

You do not push against prevailing behaviour/norms/attitudes, occasionally including bowing to peer pressure. You do not attempt to exert a large amount of influence on the course of events, whether a specific series of events or events in general. A person who does this is commonly referred to as 'laidback' or 'easygoing'. What can be understood is that a person who goes with the flow is not reactive or in opposition hence without criticality — a trait of character which can be interpreted as passive and submissive.

The capitalist economy favours accelerated modes of production and everyday life, affecting our physical conditions and online existence where we navigate default settings, which in turn favour automated behaviours for a smoother and faster, more efficient consumption. The new technologies are crucial in how the crowd is modelled into the continuous motion processes of today´s profit led society.

> 'Acceleration is the essential feature of capitalist growth: productivity increase implies an intensification in the rhythm of production and exploitation. (…) Furthermore, capitalist power, in the age of complexity, is not based on slow, rational, conscious decisions, but on embedded automatisms which do not move at the speed of the human brain'. Berardi, 2013. [80]

Initially, our need for flow is vital as the continuous circulation of fluids, cells and information within our bodies is essential for our survival and cellular (bodily) identity. To maintain cellular, tissue, organs, a constant supply of free energy from outside is required. Cells obtain energy from their surroundings either in the form of light energy or chemical energy to reduce and avoid entropy. This flow of energy through the cell is constant and repetitive with no other aim than sustaining life, not with an aim of surplus. The body is always in search of homeostasis. On an even more microscopic level our cells are also intrinsically circulating information. For example the DNA molecules contain genetic information and control intrinsic activities like metabolism and expression of characters by synthesizing protein molecules. The proteins then perform and regulate all activities of our cells.

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[80] Berardi, F. B. (2013) 'Accelerationism Questioned from the Point of View of the Body' *e-flux Journal* #46, June, 2013 available at https://conversations.e-flux.com/t/accelerationism-questioned-from-the-point-of-view-of-the-body/4931

However, even these natural flow processes have been transmuted into workflows through our constantly performative bodies. Keeping the body in the flow to avoid mental entropy.

Aligned with the fact that the workflow of processing data occurs in all businesses and industries. As soon as data is processed, systematised by a human or system, if it is computational, a workflow is created. Similarly to our bodily functions data is processed but the aim differs. From the natural flow of our well being, which should never be interrupted nor disrupted, the flows of productivity and performativity operate in similar manners but where the never-stop option´s goal is that of profit rather than survival.

The circulatory system of the bodily flows have been appropriated into the spiraling production of workflows and the privatised mindful flow states enabling an enhanced collective performativity. Hence flow has been monetised and turned into a biopolitical (Foucault) regulation to optimise our bodies' performativity for better production and consequently profit.

Biopolitics is linked to biopower and was first addressed in Foucault´s publication *Discipline and Punish* in 1977, 'an explosion of numerous and diverse techniques for achieving the subjugation of bodies and the control of populations, marking the beginning of an era of "biopower"' he further affirms in *The History of Sexuality*, *Vol. 1* (1980) that biopolitical power promotes a normalising society.

The notion of flow as biopolitical is directly linked to homogenisation of the crowds and as mentioned in the previous chapter how the norm that the default modes and options proposes is also instrumental in this process together with that of the flows.

The crowd is turning into a subsumed biopolitical mass which is modelled to be operated as a smooth entity preferably in a constant state of flow, from the inside out, to not disrupt consumption and production modes. The accelerated modes of workflows and production have induced the crowds into an intensified velocity of flows which are not looped but constant and repetitive within a spiralling configuration which has no ends. Unlimited capacities are required when ends do not meet.

When researching crowd simulations as well as the NPCs of computer games, the term flow refers to the most efficient mode of collective behaviour within the given environment. For the crowd to perform most appropriately and efficiently in most digital systems, flow needs to be sustained. This goes hand in hand with the navigational logic of how the virtual world unfolds

itself continuously to the visitor/player. Within that logic there are no cuts, as in a film, but a constant flow of unfolding 3D images which are activated by the camera view. This world of flows which the visitor/player navigates enhances the immersive experience of the game. Hence the simulated world/computer game world is a space and world of flows.

Online the crowd flows as well, while navigating the web. They scroll up and down, click and move on, to (time) effectively consume shared information or goods. In crowd simulation the flow of the moving agent needs to be preserved for management purposes but also to create an image of a smooth moving crowd. At the same time the movements have to be contained, small, so that the crowd appears as an entity, a mass, which does not interfere with the main narrative occurring in front of the camera of the given simulated scene. When it comes to crowd management the crowds need to be fluent within urban space and systematised environments such as the Underground. The interference of the motion of the masses can create obstructions which can cause delays or congestions. Hence to flow is the optimised state of collective behaviour where avoiding others and obstacles enables a malleable moving mass.

As mentioned earlier, by the football fan, flow is everywhere. Not only within crowd management but in the fields of economics, finance as well as in computational systems, human migration flows, psychology (mindfulness) where flow is used to describe states and functions. Flow has become a state and verb to describe an efficient and optimised behaviour while at the same time promoting the velocity of production. A new fluent state where the rational and homogenous behaviour of the crowd favoring today's capitalist economy. Looking into the correlation and commonality in the use of the notion and term of flow within these various fields may inform us on the political status of today's crowds and the conditions in which they operate.

This text, at this time, will not address all these fields but introduce the correlation between the management and digital representations of crowds and crowd theory from a critical perspective (addressing their respective politicisation).

The flow of the masses

In the early nineteenth century, William Wordsworth describes the London crowds in *The Prelude or the Growth of a Poet´s Mind*, as forced to become a flowing homogenous mass.

Perpetual flow

Of trivial objects, melted and reduced

To one identity by differences

That have no law, no meaning, no end

The perpetual flow referenced by Wordsworth is that of the masses of people who are becoming instrumentalised into an eco-political system driven by a profit oriented economy where the automation and hence, dehumanisation (objectification) of its members preserves the continuous flow. A non-empathetic person to person behaviour administered to facilitate the handling of the crowd as a unified entity without discerning its members as people with any individual or a common agency.

A small reminder here is that this research´s standpoint is that the crowd is an assembly of singulars. A self-mobilised crowd is an assembly of people with their own historicity acting together towards a common goal. The crowd organised by an implemented system, such as the surveilled urban crowd or an online crowd on social media platforms, is a monitored crowd, but where the participants have different goals, intentions and rights but are organised into an overall algorithmically operated system. To acknowledge and respect the heterogeneity of the crowd and the rights of its members is to acknowledge them as singulars, political subjects, within the crowd. A crowd of people allowed their individual agency.

During the twentieth century, cities grew, and so did the populations. The modern era became that of the crowd. The management of these growing crowds became essential for the smoothness of the systems and infrastructures in place. The urban machinery needed to be well oiled so that the crowd could run through it as an organic liquid as a constant workflow force.

The organisation of the crowd in urban areas became crucial not only in the industries but also in their habitat where the repetitive aesthetics of urban developments reminiscent of the assembly line. People dwelling as organic identities amongst the mathematically organised environment as can be seen in L.S. Lowry's famous painting.

In the 1920s and '30s, Siegfried Kracauer referred to the urban crowds as mass ornaments. A mass emerging from the wake of industrialism embodying the characteristics of the capitalistic system.

> 'The mass ornament is the aesthetic reflex of the rationality to which the prevailing economic system aspires.'[81]

Kracauer writes:

> 'Like the mass ornament, the capitalist production process is an end in itself. The commodities that it spews forth are not actually produced to be possessed; instead, they are made for the sake of a profit that knows no limit. Its growth is tied to that of business'[82]

The urban complex mimics the capitalist economy where people as money circulate or spiral up in an accelerated frenzy of growth. A circulating mass ornament of bodies and capital that is reminiscent of the kaleidoscopic images of Busby Berkeley´s mass choreographies from the 1930s[83].

Elias Canetti, on the other hand, referred to the crowd as a river as a moving crowd which does not reach its goal. It is the symbol of a movement which is still under control, before the eruption and the discharge; it contains the threat of these rather than their actuality (Canetti, 1960).

The crowd is in a flow of continuity of movement; a perpetuation with no goal, just a moment of fluidity, moving forward under pressure and towards a promise of a better existence. Canetti's perception of the crowd as a whole is more of a symbolic nature where the spirit of a moving crowd is that of motion which is inherent to the crowd's nature rather than of the outside economy-political influences. Hence confronting the natural agency of the crowd moving at its own free will in contrast with the crowds of the mass ornament who are orchestrated by an outside force.

The flow of crowds is based on the fact that the crowd is moving towards a goal. However, to keep the flow the goal needs to be unreachable. Hence this inherent crowd behaviour is being instrumentalised by the capitalist regime so that the crowd keeps moving. As Kracauer noted,

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[81] Kracauer, S. (1927) 'The Mass Ornament' [June 1927]. trans. T.Y. Levin, in *The Mass Ornament: Weimar Essays*. ed. 1995, Cambridge/London: Harvard University Press.p. 78-79

[82] Kracauer, S. (1927) 'The Mass Ornament' [June 1927]. trans. T.Y. Levin, in *The Mass Ornament: Weimar Essays*. ed. 1995, Cambridge/London: Harvard University Press.p. 78-79

[83] Kracauer referred to the Tiller Girls' synchronised dance but here the reference to Busby Berkeley is of interest as with his background in the military and vast Hollywood productions brought these synchronised mass choreographies into yet another political and economic dimension.

you are part of a swirling wheel system with no limit, that of capitalism which has no purpose but to accelerate itself, to continuously swell for profit. For manufacturers and corporations, flow equals the production of capital.

To keep the flow is to preserve the inflow of money. To manage this flow is power and control over capital flow. Hence flow is the common notion between the crowd and capital. Two mass societal entities made interdependent through the capitalistic system.

The postdigital flows

> 'As people participate in the flows of power, languages, and logics created by technical objects, the processes of these objects become normalized and we become entangled in their interrelations across various scales. As we become familiar with how software operates within computation and culture more generally, it makes sense for us to learn how such logics operate in other spheres, such as social process, politics, and economics'. Yokokoji & Harwood, Evil Media Distribution Center, 2017.[84]

During the development of industrialisation, flow is associated with the flow of production of the assembly line. The next shift in the notion of flow linked to the prevalent economic system arrives with that of globalisation and deployment of computational technologies in all areas of everyday life. Referred to by Shoshana Zuboff as the 'second modernity', with the implementation of new technologies operating the crowd in individual detail while collecting its data. Zuboff states that: there is a shift from the masses to the individual, liberating and reconfiguring capitalism´s operations and assets.

> 'Furthermore, with that shift, the neo-liberal paradigm aims to reverse, subdue, impede, and even destroy the individual urge toward psychological self-determination and moral agency.' Zuboff, 2018. [85]

[84] Bishop R., Gansing K., Parikka J., Wilk E. (eds.), *across & beyond: A transmediale Reader on Post-digital Practices, Concepts, and Institutions*, Berlin: Sternberg & Transmediale, 2017, p. 066 .
[85] Zuboff, S. (2018) *The Age of Surveillance Capitalism*, Profile books. P. 43

When you deregulate the market through privatisations you distribute the responsibility of society's production upon individuals which brings about individualistic behaviour but also, by extension, it turns the individual into an entity responsible for the functioning of society as a whole.

It has been stressed that in the second modernity the individual becomes the moral bearer of the system in which it operates as the optimisation of the self is in extension the optimisation of your life, condition and behaviour. The new technological tools and data harvesting through the quantification of the self through the apps available on our mobile devices, to upload and track our bodies organic performance, such as daily walked steps, sleep modes and so forth implement a self-reliance and evaluation of the level of performance, production and consumption which has been intensified by an online rating system. Every enterprise, and product, today, is rated by the consumer, from one to five stars. A rating system which creates yet another competitive layer.

With the new capitalist economy of markets and global infrastructures for continuous work, the 24/7 market rhythm and the 24/7 working bodies are aligned into a machinery of constant repetitive, looped, systems where work is everywhere all the time, where flow becomes a term and tool for the idea of "progress"..As with the quantification of the self, monitoring the internal flows is then to be adjusted to the external flows. An inside-outside system of flows aligned with an uploaded body enabling a total and constant flow through the bodies of the crowd.

> 'Against the backdrop of late capitalism, the rise of wearable biometric monitoring can only be understood as a disciplinary power traversing the body itself and all its flows'. Greenfield, 2017. [86]

The 24/7 working body assimilates itself into the constant workflow, a continuous process of production associated with the other flows that the crowds are organised into. As Steven Shaviro (2013) puts it: 'This means that everything in life must now be seen as a kind of labour: we are still working, even when we consume, and even when we are asleep' (Shaviro, 2013). Brian Massumi's recent manifesto brings in the individual, or could we rather say in reference to Deleuze, the 'dividual' (Deleuze, 1992) into the contemporary condition in which the crowd operate in the era of surveillance capitalism[9].

[86] Greenfield. A. (2017) *Radical Technologies*, London: Verso Books. P. 35

> 'The individual dips into the flow in such a way as to fashion its person as a miniaturization of the overall movement. Its life-activity becomes a quantum of capitalist surplus-value to its self-driving core. Its job is to surf the movements of capital... This life-surfing fashions the individual as an ambulant personification of surplus-value of flow. The individual's job description is its life description: to strategically play the qualitative differentials that compose its field of life'. Massumi, 2018. [87]

This concept becomes interesting when set against Maurice Blanchot´s statement during the 1940s and '50s that the everyday was seen by some to have a core revolutionary potential as its essence were that it was without event. This phenomenon is today eradicated by the 24/7 society and online (distraction) economy where every waking moment is capitalised upon (Crary, 2014).[88]

For Gilles Deleuze in 'Postscript of the Societies of Control', it is time itself that becomes monetised, and the individual redefined as a full-time economic agent. Due to the fact that we today participate in both physical and digital crowds and networks simultaneously, this phenomenon is intensified, linked to an overall accelerated system/infrastructure. As Adam Greenfield states in *Radical Technologies*:

> 'Our selfhood is smeared out across a global mesh of nodes and links: all the aspects of our personality we think of as constituting who we are we owe to the fact of our connection with that mesh, and the selves and distant resources to which it binds us. We make networks and they shape us'. Greenfield, 2017.[89] p.27)

The new technologies link us while distancing us from one another affecting our collective behaviour and production modes.

Jonathan Crary mentions in *24/7* that

> 'the individual in our contemporary society experiences a continuous process of distension and expansion, co-occurring on different levels and in different

[87] Massumi, B. (2018) *99 Theses on the Revaluation of Value: A Postcapitalist Manifesto*, Minneapolis: University of Minnesota Press. P. 31-32
[88] Crary, J. (2014) 24/7: *Late Capitalism and the Ends of Sleep*, London: Verso Books.
[89] Greenfield. A. (2017) *Radical Technologies*, London: Verso Books. p.78

> locations, a process in which there is a multiplication of the areas of time and experience that are annexed to new machinic tasks and demands. A logic of displacement (or obsolescence) is conjoined with a broadening and diversifying of the processes and flows to which an individual becomes effectively linked' Crary, 2014.[90]

The Internet is a space of flow in the way that it is a space of connectedness and flow of information. The atomised bodies of the internet have no potential friction. The physical interaction is left out for the smooth circulation of people and production, the connected atomization of these crowds enables a consistent virtual flow.

On the internet we surf. The circulation is fluid as we move virtually by swiping and scrolling in different directions. As a collective we produce a constant movement, monitored, feeding into the system/machine of information and capital as data is collected through our displacements on the net. We leave virtual traces of information which is gathered on us. The flow, especially workflows, are traceable as it processes and produces data.

The digital network which operates us collectively through digital surveillance systems and individually through our mobile devices links us all together. The smart mobile devices that we use to send information/data between them (such as the GPS for navigational purposes) organises the crowd into efficiently operational entities. This of course in favor of our own needs and desires but as always comes at a cost through the data we provide.

> 'Now these flows (of information transpiring from smart devices etc.) can be traced, at least in principle, and plotted in space and time. Latent patterns and unexpected correlations can be identified, in turn suggesting points of effective intervention to those with a mind to exert control'. Greenfield, 2017 [91]

As Greenfield states it not only optimises the flows of the crowd but allows a dissimulated implementation of control. Today´s computational environment uses default settings and algorithms which simplify the system for the user so he/she can go about faster and easier with the program or given technology while it harvests data on their behaviour for better control of these same behaviours, through predictive models. Another helpful technical service which hides its data capitalising intentions. These shortcuts accelerate the flow but they also affect

[90] Crary, J. (2014) 24/7: *Late Capitalism and the Ends of Sleep*, London: Verso Books. P. 43
[91] Greenfield. A. (2017) *Radical Technologies*, London: Verso Books. p.2

our behaviour by enhancing our lack of patience, which in turn fuels the systems to respond and act faster. The default settings propose a frictionless navigation avoiding the hurdles of computational complexities inherent to the digital crowd.

Simulating flows

When researching crowd simulations as well as in the virtual world in computer games, the term flow refers to the most efficient mode of collective behaviour within the given environment. When simulating a crowd digitally, avoiding collision is the main feature that keeps the crowd's flow. The agent is programmed to avert other agents as well as objects, for other human bodies are only yet another block in the flow.

The simplified behaviour and characteristics, the limited artificial intelligence, of the proposed default character in the crowd simulation software favours the homogenous identity of the simulated crowd and hence its even flow and aesthetic identity as a moving mass.

Consequently this faceless mass made by standardised members moving around in the background do not interfere with the narrative played out by the main characters in the foreground. Hence a hierarchy is set in place which enables the given authority to dominate. Hence, for the crowd to perform most appropriately and efficiently in most digital systems, flow needs to be sustained

> 'The technology of contemporary society – which physically embodied a network through neat nodes and connections – offered an outline, an example, of how power (literally) flows.' Chun, 2015. [92]

Online the crowd flows as well while navigating the web. They scroll up and down, click and move on, to (time) effectively consume shared information or goods. In crowd simulation for films the flow has to be constant to create a vivid and living crowd but at the same time the movements have to be contained, small, so that the crowd appears as an entity. In crowd management the simulated crowds, as well as the physical that these crowds are representing, need to be fluent within urban space and systematized environments such as the Underground. The interference of the motion of the masses can create obstructions or bottlenecks, which can

[92] Chun, W. H. K. (2015) 'Networks NOW: Belated Too Early', in *Postdigital Aesthetics: Art, Computation and Design*, eds. Berry, D.M, and Dieter, M. (London: Palgrave MacMillan p.292

cause delays or congestions. Hence to keep the flow is the optimised state and behaviour. Fluently avoiding others and obstacles.

Various terms involving liquidity and flow are frequent as metaphors to describe the dynamics of crowds especially in crowd management.

Nevertheless there is a difference here between the referenced flows and liquidity and liquid forms when it comes to the crowds. A crowd can have a liquid form but the flow is the motion it is put into. Hence flow is the force applied onto the crowd while liquid is the matter of the crowd. It appears as a method or conductor of efficiency for the smooth motion of the masses and ideal collective behavioural patterns

> 'Liquidity is a secondary feature of the emblematic mass. It is present to the degree required for individuals to lose their contours in order to regain them within the confines of a single corporate body.' Schnapp and Tiews, 2006. [93]

The liquid metaphor, here referred to by Jeffrey T. Schnapp in the anthology *Crowds* (which was linked to the Crowds Lab at Stanford in the late 90s and early 2000s), brings forward an image of a fluid entity, a corporate/corporal body, where the people composing it act as small particles with minimum interactive friction. A standardised choreography of synchronised gestures where the individual dissolves in favour of the moving mass. The crowd is a homogenous entity with one common agenda. As a member of the fluid crowd, you need to comply with the logic of the swarm: coordinated behaviours and a common direction. A utopian idea of a crowd as people/humans are per definition unable to swarm. Fish and birds can swarm as they operate not only according to x and y but also to z. They move as mass in space, water or air, not only according to the ground and in a single shell (aircraft or boat). The reference to swarms, especially productive swarms, such as bees and ants, is tantalizing when thinking about a workforce as an optimised unified entity. As mentioned earlier, that mass is more malleable to fit to the system/infrastructure into which they are fitted if acting in a synchronised and similar manner which is easier to control as a mass.

A behavioural theory of how a crowd can act as homogeneously as possible, and the closest idea of that of a mentally swarming crowd (as humans cannot swarm) is engendered by an allegedly transmissive behaviour between the constituents of the given crowd. There are new

[93] Schnapp, J. T. and Tiews, M. eds. (2006) *Crowds*, Stanford University Press. eds. T. Schnapp and M. Tiews, San Francisco: Stanford University Press.p.5

findings which addresses Freud's interest in the 'telepathy effects' he addressed with caution in *Psychoanalysis and Telepathy*, 1921, where the transfer of action through the mind can be likened to that of the contagion effect functioning as an electric conductor.

> 'Electrochemical charges and energies may be assigned to the thoughts, emotions and actions of the human body and these may often be psychologically and socially coordinated and coherent with others: two people may change state at the same time. A macroscopically relevant coherence may result in approximately simultaneous thoughts and actions, and even a form of knowledge, between separated people.'Hass, 2011.[94]

Contagion as addressed by Gabriel Tarde and Gustave Le Bon, is the motor that promotes the crowd's common motion and flow acting as an electric circuit between the crowd members generating a unified and fluid movement which Jeffrey T. Schnapp refers to as mass communion.

> 'The intent is to electrify. Their enemy is the void: the gap in the crowd that threatens to break the circuit of feelings of mass communion and contagion.' Schnapp, 2006. [95]

Mass communion becomes a practical tool for managing people into homogenous behaviour. By implementing an 'electric circuit', a flow of electricity between the crowd members, the crowd can be more easily controlled. This electric circuit could potentially be flowing through the people of the crowd, via their individual mobile devices, a connecting flow circuit directed by satellites and masts. These mobile technological devices can read the crowd individually linked to a single network. Connecting the minds of the online crowd.

The privatised state of flow

To be able to endure the exhausting accelerated existence of today's society many have turned to mindfulness, positive psychology and the broader happiness industry. Today these forms of relaxation have been monetised and consequently have politicised and privatised stress whilst

[94] Hass, A. (2011) 'The Interpretation of Telepathy like Effects: A Novel Electromagnetic and Synchronistic Version of the Psychoanalytic Model', in *NeuroQuantology* vol 9 no,1 AnKa Publishing, doi: 10.14704/nq.2011.9.1.387. p.23

[95] Schnapp, J. T. (2006) "Mob Porn", in *Crowds*, Edited by Jeffrey T. Schnapp and Matthew Tiews, San Francisco: Stanford University Press.

becoming an artificial respiration, a small moment of respite and physical recuperation just to be able to perform more. Miles Neale (a Buddhist teacher and psychotherapist) has coined privatised mindfulness as McMindfulness. An appropriation, starting in the '60s, where the present aesthetics emerged with new technologies, during the New Age movement in the '90s. As stated by R.E Purser.

> 'Although derived from Buddhism, it's been stripped of the teachings on ethics that accompanied it, as well as the liberating aim of dissolving attachment to a false sense of self while enacting compassion for all other beings. What remains is a tool of self-discipline, disguised as self-help. Instead of setting practitioners free, it helps them adjust to the very conditions that caused their problems'. Purser, 2019. [96]

Hence mindfulness becomes a form of capitalist spirituality, perfectly attuned to maintain the neoliberal self. Purser notes that Slavoj Žižek states that 'mindfulness is establishing itself as the hegemonic ideology of global capitalism, by helping people to fully participate in the capitalist dynamic while retaining the appearance of mental sanity' (Purser, p.29).

In a self-evaluating system operated in detail by new technologies, the monitoring of our behaviour becomes self-administered, through the sharing of our data. Not only does the system proclaim the flow of the crowd but so does the crowd itself. The moment which is supposed to be that of pause and escape from the workflow becomes another submissive state.

Within the current exceptional state of COVID-19, the experiencing of an atomised and physically/socially distanced crowd is ubiquitous. The virus isolates the members of the crowd, forcing them into digital/online work and social relations. The increase of surveillance and tracking systems through mobile devices and online activity has been heightened within a short period of time. This new situation has fast-forwarded us, the crowd, into an intensified online existence which can reveal the importance of physical sociality and organically shared experiences. However, it can also bring forward an even more surveilled society where instead of solidarity an increased polarisation which can lead to extreme right-wing populism.

[96] Purser, R.E. (2019) *McMindfulness: How Mindfulness Became the New Capitalist Spirituality*, London: Repeater Books. P. 8.

As we are presently amid the pandemic, we do not know the outcomes. We can only account for the atomised and digitised state in which we are living our everyday life, when not an essential worker. Will our collective behaviour be forever altered? Or will we, if there is an end, go back to how we used to behave but in an enhanced computational environment monitoring in detail our gestures and geographic locations?

This new online existence enables the crowd of non-essential workers to continue in the flow even if isolated, unless they have been fired.

How then can the crowd and its subjects regain agency from the smoothened flow in which he/she is being subsumed when not in the present state of exception? Or is this state of exception and crisis permanent as Agamben is proclaiming where the crowds are constantly rationalised and into a permanent state of control.

There is not only one flow which represents the crowd´s behaviour. There are the uneven and complex flows of the crowd's emotional and irrational behaviour.

A non rationalised assembly of currents which do not want to fit into the controlled flows.

Canetti refers to the natural identity of the crowd as the sea that never sleeps, 'by day and by night it makes itself heard, throughout the years and decades and centuries. In its impetus and its rage, it brings to mind the one entity which shares these attributes in the same degree, that is the crowd.' (Canetti, p.80).

The metaphor of the crowd as an ocean, a tumultus fluid where waves and underlying currents disrupt and disturb, was established already in the Greco-Roman period and known as the *oceanic mass*. An unruly, turbulent crowd of civil disorder also referred to as the mob and *turba* (the Latin word for crowd), which needs to be managed and controlled. *Turba* was a threat to the given authority and described as a domestic enemy force. A political crowd, in motion, acting on democratic values which needed to be monitored.

Today the will and power of collective frustrations is a roaming sea which is not only roaring in reaction but also aligned with the constant machinery of flows, considering that the oceanic crowd is driven by emotions threatening the systems in which it is circumscribed.

In early twentieth century, Italian discourse the phrase *la folla oceanica* (the 'oceanic mass' as referred to by Schnapp) served to legitimise fascism's claim that they alone could master the

mysterious forces that characterised the era of crowds (as referred to by Le Bon alluding to the rise of the popular masses, revolutions etc.) (Schnapp and Tiews, p.3).

The movement and inherent potential agenda of the crowd which uses and occupies public space, the streets, can be associated with a free flow. Where the flow is self organised by the crowd and not choreographed by a system or external power. The free flow is here associated with the notion of democracy.[97] The streets are still considered and used as a public space for manifestation even if monitored and surveilled. Still, the free-flowing crowd mobilise as these surveillance systems, intended to control the unruly mob, can also be used to statistically prove what number of people are standing up for the manifested cause. The crowd assembles because the physical mobilisation still has power as this embodied political mass can act as a counter current.

However, there are no free flowing crowds as we now are constantly tracked and surveilled. There can be an appearance of one but not the reality of one.

In psychology the state of flow is known as when a person becomes entirely immersed in their work, is carried away in a current, disregarding their physical needs. A state where work takes over the connection to your own physicality.

If a market or political regime can via a strategy put a person in that state, where the mind detaches itself from its body then that becomes the ultimate productive and performative online being. A hypothesis linked to that of the crowd and the hypnotiser mentioned in the first chapter on crowds and simulations.

In the post-Fordist era of the 24/7 working body, a political agency of the crowd subject may emerge from an interference of the flow.

The Invisible Committee (a group of anonymous anarchist writers) argues that political action and revolt can result from the interruption of these flows:

> There is no longer a "sphere of reproduction" of labour power and social relations distinct from the sphere of production, which itself is no longer a

[97] Philippopoulos, A., 2015. *Spatial Justice Body, Lawscape, Atmosphere.* USA: Routledge. Andreas Philippopoulos uses the notion of *lawscape to describe* an equation between law and space a condition he defines as inseparable. " … at various points a *lawscape* appears more or less legal, or more or less spatial. This interplay is what allows a body to negotiate its position in the *lawscape*"(…) *This takes place as a play of visibilisation and invisibilisation".*

> sphere, but rather the web of the world with all its relations. To physically attack these flows, at any point, is, therefore, to politically attack the system as a whole. If the subject of the strike was the working class, the subject of the blockade is whoever. It's anyone at all, anyone who takes a stand against the existing organisation of the world.[98]

The awareness of being part of the flow together is the potentiality to act online or in physical space upon these artificial flows. Possibly a corporate, as in corporal, mobilisation of disruption in form of active immobility or to certain extent an offline mode? As this research argues the organic body is the tool which we have to disrupt and unravel our online and digitised existence with. What can then be the potential power of a collective embodied awareness, assembled towards the immaterial space of flows and power in the digital, online, realm? No singular body has power, unless it is a person of major authority, political or economic power. It is the accumulated bodies, the crowds, which can act to make resistance as in the actions on Gamestop where the players resisted through action of buying shares which lead to a shared economic power gesture. Aligned with the organic body there is the natural flows which can reinvigorate counter currents, not by going back to nature in an escapist mode, but rather by using the shared flows of solidarity and empathy which in extension leads to pluralist democratic values where counter arguments and discussions can be made without violent or condemning consequences. These democratic values and actions could further extend into structural change on a vast even global level. Yet that needs a crawling out of the individualistic shell which many are caught in and which is fortified daily by competitive pressure.

We are monitored to avoid each other for the profit of the flow, which can lead to further distanciations and polarisations while all individualised forms of flows profess individualistic behaviours. The atomisation and automation of the crowd into particle ordered homogenous crowds entities withholds the crowds in the flow and suppress the awareness and potential mobilisations, undermining their agency.

Today´s flows, governed by the capitalist system, spiral upwards with different levels organised from the bottom to the top by class and economic power. A sense of an accelerated vertiginous existence which seems to have no limit, except for that of collapse, physical and environmental exhaustion.

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[98] The Invisible Committee, 2015, *To Our Friends*, MIT Press.

The crowd is tied up in several artificially orchestrated flows at the same time, from the mindful flow states to the flow of information and the flow of money as well as the workflows. None of these flows are interrupted and are acting as multiple flows operating and traversing the crowd at once to preserve the general flow of money. These flows act as multiple threads which entangle the crowd into an accelerated and 24/7 monetised existence with no disruption even in states of crisis and exceptions.

The Power of Flow. The Flow of Power

The flow in practice.

To be able to address and analyse these flows through the practice, I decided to make the audience experience them through immersive effects enabled by the editing of the film, which borrowed the logic of navigation as a continuous unfolding of time and space. The film uses found footage to be able to reflect how these flows are manifesting themselves around us in the digital realm. But also how these flows impact upon our collective bodies as in the work in progress Flow States.

The Power of Flow. The Flow of Power (2020) film

Figure 30 - Still from The Power of Flow. The Flow of Power (2020).

Through an immersive experience this essay film addresses how the notion and term of flow and state of flow have been monetised by our current economy and accelerated society.

The film navigates through the various uses of flow in crowd management, economics and in simulations of crowds. But also through visuals and sounds of flow, such as water streams, sea and the antigravital experience of outer space used for relaxation, deep sleep and meditation purposes. These modes of relaxation are an instrumental part of the continuous flow linked to our current economic systems and accelerated production modes, acting as artificial/small pauses for a better corporal endurance and performativity. The notion of flow inherent to our bodily survival system of circulation of blood, oxygen and nutrients are now hijacked by our current economic system.

The montage editing process of the film is similar and stems from the same traditions as in the previous works (such as *Default Character* and *Di-simulated Crowds*) however it borrows the logic of navigation where the clips unfold into each other for a continuous and immersive experience of various flows. The navigation is using the logic of a flow and bounds together by different motion effects, rhythm and temporalities of the sequences as well as the immersive

experience of the hypnotical 'trans-effects' proposed by the sound and image of the mindfulness YouTube clips. Putting the viewer into a position of experiencing the flows while the overall experience and composition of the film equates to a critical and associative analysis. Being in a state of flow has become a monetised phenomenon used for profitable economic schemes rather than the welfare, health of the user. There is occasionally a transparency in the obsolete attempt to implement a state of relaxation on a platform such as YouTube when there is an active chat-flow which appears on the right hand side of the relaxing clip or sound. This multi-active page represents the symbiotic clash between mindfulness and today´s distraction economy.

Other clips in the film refer to displacement as flow, may it be on the bigger scale of human flows such as migration and refugees but also the more local functional mechanised motion enablers such as walkways and escalators, featuring one of the earliest of its kind.

In the film the body is operating in different ways, as a flowing entity penetrating the immersive images or through the simulated blood circulation through the veins, to the moving bodies on mechanical walkways to finally the total digital mindful body online. The film's editing mimics the immersive navigational experience of the computer game yet is made through a montage.

The film starts in the 60s with 'analogue' images from a super 8 camera showing water streams in nature and psychedelic watercolour blends with the accompanying voice over describing the Buddhist, Taoist mindset. These images propose a series of clips which relate to original and nature related flows and the empathetic collective spirit of the Taoist and Buddhist flow states/zen rather than the self-help movement it became through the appropriation by the west´s mindfulness.

By focusing on the term of flow in its commodified version the film inherently positions itself as critical towards a phenomenon where within the term and use of flow where both the biometric (body) and eco-political is combined and modelled into a controlled whole. As a 'totalitarian body' operated by data and distraction economies. A dystopian image of how flows are operating the crowd yet with a visually hypnotic, stimulating and immersive effect reminding the viewer of the efficiency of how flows are used upon us.

In the film there are sequences from inside the storm Katrina: images from a surveillance camera still working but due to the storm, now floating in the water which had flooded the

given vicinity. There is no human agency behind the camera, just a floating device recording the present. Our view, and bodies, are now navigating with the camera, a loss of control and agency, just the victim of the storm in the hands of nature. The flow we are in is not guided by any human hands or calculated by any technology, just technology that records. From the orchestrated flows of the computer game, the digital simulation of body fluids to the online chat flows the viewer is now let into the flow of anthropocenic homeostasis. Where due to human interaction with the world the natural flows are destabilised and climatic catastrophes are putting the bamboozled crowd into a state of disorientation.

The film proposes various flows, combining and confronting the real natural flows with the calculating and predictive, artificial flows orchestrated through various digital technologies and computational environments. A montage of juxtapositions which puts forward the fact that a natural flow is something we depend upon but that we cannot predict, rather we need to trust its natural order.

Figure 31 - Still from Flow States (2020-) Work in progress.

Flow States (performance video) work in progress in collaboration with choreographer, dancer and editor in chief of *Koreografisk Journal*, Rebecca Chentinell.

In this work in progress Rebecca and I have discussed and reflected together on how the body is to operate in these 24/7 flows. This has resulted in a choreographic score which we have coupled with the soundtrack of the film *The Power of Flow. The Flow of Power* so that the

works can be shown together (as they were at the Contemporary Art Center, Pylon Lab in Dresden, 2020). The choreographic score depicted a body moving in slow motion but where every muscle was utmostly tense. In appearance a relaxed performance but up close a body in a total 'in-tense' state. The head was tilted down making the long hair of the performer (in this case Rebecca) obliterating the face and hence making the body anonymous and androgynous.

When the crowd is instrumentalised into the different flows which have been appropriated by today's accelerated society and economy, they need to conform to the system in place – ideally becoming a frictionless entity, smoothly evolving within the given currents. To enable this smoothness, a constant, preferably accelerated, pace of production and performativity needs to be maintained. The physical performance heightened. The automated functions implanted by the new technologies, through apps and software, where the default settings enable a faster and more comfortable use, generate common and defaulted gestures and behaviours. The crowd's bodies and minds become bendable/adaptable/smooth/flowing and fit to function together within the fast currents. At the same time, a sense of self-empowerment is installed to enable an entrepreneurial creative thinking to produce new selling ideas for the market. New technologies are made in today's global economy to operate millions, billions of people yet proposing a unique experience to the user. Hence, the crowd needs to be composed of default operated characters which can be individually customised within the software but acting within/according to the overall algorithmic (AI) logic of the program. In short, the crowd's behaviour needs to comply with the general computational system and logic set in place by today's global economy producing simplified and similar behaviours which enables a common flow. Flows running through the world as workflow veins pumping the crowd's productivity and performativity and consumption ideally complying to the uncomplicated and time-consuming default options, which in turn produces a common collective behaviour, which does not encompass a common agenda but a collective behaviour according to a system which is imposed/ by a hegemony of/by a few leading companies. Companies who have been denying their political implications while celebrating their economic prosperity now collaborate with governments for a 'solutionist'[99] future combating environmental threats. (Klein, 2020; Mozorov, 2013) However, with the experience of the pandemic, there has been evidence (covid spread/contamination tracking apps) that tracking and surveillance of crowd behaviour has

[99] Evgeny Morozov refers to "technological solutionism"as an ideology endemic to Silicon Valley that reframes complex social issues as "neatly defined problems with definite, computable solutions

been intensified and mapped extending the solutionist future (Mozorov, 2013) to that of the handling of crowds. In the end, to be able to keep the flow.

If or when we become aware of the artificial flows in which we are caught, should we be acting upon them or should we be 'easy going' and 'laid back' and just go with them?

An influence on the crowd's awareness instilled from several sources (such as the EU legislation on data harvesting and AI) may engender counter currents or flow disruptions where AI can be complexified to align with the crowds instead of subsuming their behaviour. Some dismantlement of these digital operations have also been made by leaks (such as the Snowden, Manning, Cambridge Analytica cases) which have been highly instrumental in the impositions of new transnational laws.

However, when keeping the crowd in the flow you keep it away from its possible agency. The crowd members cannot retire, have no time to reflect, achieve an awareness to be able to emancipate, mobilise against the prevailing conditions in which it operates. The bodily and mental constant performativity puts the busy body in a perpetual mode of operation.

Hence the body in flow, in constant motion presents an online and programmed body with suppressed agency.

Conclusion

What agency do crowds have in a postdigital era of surveillance and predictive simulations?

The aim of this practice-led research was to identify this agency through studies, analysis, and artistic processes for a new understanding of the aesthetics and politics of the tools and mechanisms which govern and mediate today's crowds.

Today the crowd is globally operated, bound through a globalised economy, while operating in an interconnected, invisible web of smart digital systems, which are continuously archiving data on human behaviour. These technologies are getting more and more complex, while their functions remain invisible and ungraspable to the crowd that operates them. Our use of smart devices and our online lives of bubbles and social filters produce a sense of alienation, not only with respect to these technologies, but also in relation to others. This phenomenon increases the atomisation of people and promulgates a fragmented crowd, while raising the risk of polarisation and division.

At the same time our digital and physical identities are getting more deeply entangled. We navigate a world of devices and technologies where our digital and 'real' lives have merged into a symbiotic coexistence.

Anyone with personalised access to the internet is a part of that crowd. In this regard, this research project has been realised from within the crowd; as a researcher I am one of the users and a body within this globalised, postdigital collective.

This methodological approach of investigating the crowd from within, intrinsically implied a postindividualistic standpoint. According to such a postindividualistic stance might consider ourselves beyond our customised environments and social bubbles, as parts of a bigger, globalised, connected crowd: a crowd with a collective and democratic consciousness, composed of subjects with agency. Hence, the crowd, in this research, is an example and a metaphor of society as a milieu of co-existence in a pluralist democracy (Mouffe, 2016). Annexed to this position is the postdigital condition which in its entangled and permeated digital existence and surveillance offers no outside.

New digital technologies and systems have made it possible for the economic and political regimes that govern the crowds to penetrate them into the bone. This monopolistic system is exerting an authoritarian control over the modelling of crowds, using their behavioural and biometric data in order to sustain the existing economic (profit-oriented) and political (authoritarian) regime. Today a limited number of multinational corporations control the majority of all user data, and the linked digital predictive models. This globalised monopoly has a direct impact on the corporal and gestural language, and the collective behaviour, of today's postdigital crowds. Therefore, the aim of this research project has been to address the ramifications of this situation, seeking to articulate them spatially through various materials, visualisations and corporeal remediations.

Uniquely appropriate to the object of study, my alternative research methods facilitate combination and dialogue between multiple investigative and analytical approaches, enabling an embodied understanding of how digital technologies are operating the postdigital crowds, and for what aims. These methods include, first of all, the artistic practice, which has enabled the embodied, visual, sensorial and experienced knowledge produced in this research; second, the scholarly research, which theoretically, historically and critically contextualises the practice-led research, weaving in social, political and economic references. Finally, my collaboration with Ubisoft has given me insight into how the industry is building the interactive digitally simulated crowds which will in different ways be rendered operational in the future, in domains beyond that of entertainment.

The contest between algorithmic, digital crowds and analogue, organic crowds, has been at the core of my research, defining my methodological approach. Through the embodied art practices and processes, it was possible for me to create visualisations of the transformation of the crowd subject's behaviour, while addressing the symbiotic relationship between the digital and the organic human body.

By allowing this research to stretch into all these directions, while tying them back into the core of the research problem, the practice-based research projects facilitated a transdisciplinary approach yielding new embodied outcomes, while remaining demarcated from traditional academic research. This allows the research to be accessible not only to an informed academic audience, but also to a more general public.

The combination of these different techniques has made it possible for me to identify how new strategic modes and mechanisms, such as default options and notions of flow, are instrumental in new aesthetic representations of the crowd, with concrete ramifications for the corporeal language and collective behaviour of the crowd's subjects, and with significant implications for our understanding of the mutating politics of the twenty-first century crowd.

I began this research by contextualising the notion and the image of the crowd historically. I then studied how crowds are depicted and operated digitally, through simulated models and tracking systems. Importantly, these models and systems are not only tools for representation, but are also used for predictive crowd management purposes, governing how crowd subjects act collectively in a coordinated and synchronised manner, while avoiding each other. The features and characteristics of the crowd subjects in these operational simulations are similar, with a customised surface, and their range of expressive gestures and behaviours is limited. The tracking systems which track the real crowd in urban space use various systems to flag and identify abnormal behaviours, which means that acting and appearing like all others, in a similar manner, is the norm. In short, the simulated as well as the tracked crowds are rationally organised so as to become more and more homogenous, since standardisation of behaviours makes it easier to operate, organise and control growing populations. The effects of such standardisation can be seen in the corporal languages and habits of crowd subjects, and it works to suppress collective agency.

In the subsequent chapters, I therefore studied a range of techniques that are instrumental in this process: default settings/options and the use of 'flows'.

Default settings distance the crowd from the complex technologies that they operate and which operate them, formatting their gestures while harvesting data. Default here not only defines the mode of operations which rationalises behaviour but also how the crowd in general becomes 'shortcutted' – standardised.

In crowd simulation software there are default agents available for use: fully pre-programmed humanoid agents. Here all the norms of the homogenous and rational crowd agent are encapsulated in a white male with limited behaviours and features. In this study, this default character (and its cousin the NPC) is therefore emblematic of the digitised and fully programmed – and hence controlled – crowd subject. May it be digital or organic.

The Default crowd, made from these default characters therefore epitomises the digitally governed (real) crowd: the postdigital crowd.

Flow, on the other hand, I understand as the dynamic politics of that same crowd: the general motion that is induced in it, to make it correspond to the accelerated production methods of the profit-oriented society in which it operates.

The monetisation of that flow, which has hi-jacked its original and natural order, lures the crowd into believing that it enjoys the natural benefits of flow, but is in fact a technique for making the crowd increase its productivity, to constantly do more and 'better'. The crowd is organised into a physically ordained order allegedly not questioning the monetised flows it adheres to, as they are disguised as natural enhancers.

Both in digital crowd simulations and in crowd management, flow is central as the prominent dynamic feature. However, it is also a prominent feature in the continuous flow of the narrative and virtual environment of computer games, which feature NPCs. To preserve this flow, digital agents and real people must avoid each other. Postdigital crowds, consequently, consist of polarised and atomised subjects maintaining continuous productive flows.

Both default and flow are therefore instrumental in the digital operations through which the dynamics and the behaviours of crowds are organised and governed. This condition affects both the aesthetics and the politics of the crowd. When a crowd is kept in a constant flow, while being kept separated from the technologies operating it, it is transformed into a homogenous malleable mass in flux. A multitude of online and tracked bodies kept in continuous productive motion extrapolated from the complexity of the technologies deployed on them.

The combination of the study of these key terms and notions of default and flow may help us form an image of what a future crowd will be. The development of AI technologies and the increasingly close and symbiotic relationship between digital agents and real humans, force us to ask how an optimised automated life will be developed. As I mention in the first chapter on simulations, in the near future we will see more intense modes of coexistence between virtual agents and real humans. How are these hybrid collectives of virtual and real personas to interact and form crowds incompatible with profit-driven technologies and platforms,

controlled by a limited number of large corporations and political regimes that maintain a strict monopoly on data and operational computational tools?

By 'agnotology' I refer to the way in which computation facilitates a systemic production and maintenance of ignorance. Computational technologies direct us towards a passive trust in widely delegated, yet obfuscated, actions (see Berry 2012). This tendency towards automated and accelerated modes of action complicates and may undermine structures of reflection and critique (Berry and Dieter, p.5).

When I started this research, general consciousness of how the new technologies are used to operate us as crowds was limited. However, during these last five years there has been evidence of an increased awareness, among users but also among governments and the EU (GDPR and the aforementioned laws on AI for example). Numerous films and television series have portrayed our digitised existence, from *Black Mirror* and *Westworld* to *Upload*. An agency may arise from a new collective consciousness of how digital technologies are used to govern the crowd. Increased popular consciousness, in combination with actions on structural levels, such as new legislations on a global scale, may open new perspectives of a future, emancipated crowd.

In the artworks in different mediums that form an integrated part of this research project, I have sought to investigate and demonstrate how a programmed, collective body could be articulated in the real. By using the physical intelligence of the human body, in works such as the performance *And or Or*, I have analysed the digital crowd agent through direct identification and physical interpretation. Such techniques have made it possible for me to reveal the discrepancy between the virtual and the real, as well as the similarities of atomised human behaviour and programmed digital agents.

In the essay films *Default Character* and *Di-Simulated Crowds*, I reflect and shed light on how the aesthetics of simulated and tracked crowds may bear on the politics of their modelling and operations.

By using found-footage clips, such as tutorial and promotional videos, showing how crowd simulations should be employed, my essay films are intended to provide resources for understanding how the crowd is depicted and operated in films, for entertainment. However, such representations are not void of politics. Firstly, because the same techniques used in the

films are then employed to organise and manage crowds for predictive purposes. Secondly, because an image of a crowd is always political, since it reflects the role of the crowd in a society at a given time.

In the choreographic performance project *And or Or*, but also in the documented performance sequences in the films *Default Character*, *Di-Simulated Crowd* and *Flow State*s, I seek to render the programmed body visible, showing how it is designed to act collectively, through abbreviated and abstracted, yet tense gestures. In these films, bodies reflect the strenuous and modulated conditions in which they operate: an accelerated society of 24/7 production modes, guided by corporate or personal profit. The performing bodies reflect these conditions, but also the digital, mathematical organisation of the crowd and its subjects – an organisation that is partly self-inflicted by the crowd subjects, in their attempts to optimise their productivity. None of these assertions are new, but my research makes visible the aesthetic and corporeal impact and the ramifications of what I have referred to as the 'loop', enabled by default settings and the flow of the crowds.

In the essay film *The Power of Flow. The Flow of Power* and the work in progress *Flow States*, the audience is immersed into the flows through which crowds are operated, and through which collective behaviours are moulded into productive, malleable, fluid entities. In the film, the audience is invited to embark on various experiences of flow, from the original natural state to the mechanised flow of walkways, to the monetised, virtual and mindful online flows. This journey shows how flows have turned into an artificial tool, which lures the crowd into the belief of self-empowerment or realisation and personal profit, while it is actually a tool to subsume the crowd into an exhaustive system of capital growth.

This is a system that models our collective behaviour, implementing an expectancy of performance. It does so not only from the outside but also from inside, self-applied by the individuals forming the crowd. An inside outside is created, a total permeation driven by a performance- and profit-oriented society. The result is a constant strain and unbalance, and a sense of never being enough, impacting both humans and nature.

As we live in a world where our digital and organic selves are entangled and merged beyond separation, the agency of both the digital and organic crowds – and even more importantly, their co-existing agency – is crucial for the understanding of how postdigital crowds will look in the future.

The postidigtal in this research was also articulated in the combination of the digital and analogue which is inherent to the process of remediation and the assemblage techniques used within the practice. An editing technique which also allows for various temporalities to meet as in the film *The Power of Flow. The Flow of Power*.

The practice-based components of this research project made it possible for me to visualise – through embodied identification – how we, parts of the global crowd, may understand how digital governance is affecting our gestures and behaviour, but also our senses of political agency and our perspectives of social emancipation.

Emergent technologies are fascinating as they are double-sided, encapsulating both hopes for a better future and doomsday visions, depending on which forces possess, drive and develop the technologies in question. Today, the question of what data will be used to program and train AI is of crucial importance, since it will determine the future of AI, with its potential autonomy of evolution. Similarly, the question of what ethics will inform the companies and regimes that develop the intelligent technologies through which crowds are formed, will determine the political nature of future societies.

Finally, let me note that, working with the above projects, I have felt an increasing urge to engage sculpturally, in a speculative and escapist manner, with composite materials, such as melted transparent plastic poured onto fractured, smashed ready-made (technological) objects. Maybe the findings of this research project must be discharged through an explosive gesture.

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