NATURAL USER INTERFACES AND THE IMAGINATION OF POST-INDUSTRIAL WARFARE: A BRIEF LOOK AT BLADE RUNNER 2049

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"Blade Runner 2049 gives us a hint how to imagine the future of warfare. According to the film, post-industrial society will be a 'post-human' society."

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I. Imagining interfaces and future warfare

If user interfaces can be considered as a key technology of the 'post-industrial' society then this is true for the 'post-industrial condition of warfare' as well. The relevance of interfaces in military technology and, vice versa, the importance of military applications for the development of interfaces is very well known. It is hardly news to consider user interfaces as an integral part of warfare. Nevertheless, current debates on "autonomous weapons systems" (AWS)[1] give us the opportunity to take a fresh look on this relation.

It can be argued that in military contexts user-interfaces are currently transformed into tools for second-order observations of highly integrated automatic operations. According to the available information, 'autonomy' in self-acting weapons is still limited to very specific tasks. Thus, the real issues with 'autonomy' concern 'teamings' between human actors and machinic actors.[2] The problem is how to develop man-machine-relations which are able to make the best out of the respective cognitive abilities of both types of actors. The design of effective interfaces is crucial to tackle this problem.[3]

As David Kirby has shown, the development of user interfaces it related to the development of "diegetic prototypes" in science fiction-films. For Kirby, diegetic prototypes such as the famous interface in *Minority Report* (US, 2002) are "[…] depictions of future technologies [to, CE] demonstrate to large public audiences a technology's need, viability and benevolence. […] These technologies only exist in the fictional world – what film scholars call the diegesis – but they exist as fully functioning objects in that world."[4]

Currently, so called "natural user interfaces" (NUIs) are regarded as the next step in the evolution of user interfaces. The idea is to abandon devices like the keyboard or the mouse and to use the "natural" interaction of our bodies (hands, voice) with the physical world as a basis for input-output-relations.[5] Following these ideas, I want to briefly sketch a scenario in which military force is controlled via a highly integrated coupling between autonomous NUIs and AWS.

1 Nehal Bhuta, Susanne Beck, Robin Geiß, Han-Yan Liu and Claus Kreß (eds.), *Autonomous weapons systems. Law, ethics, policy* (Cambridge 2016).

2 Lucy Suchman and Jutta Weber, Human-machine autonomies, in: *Autonomous weapons systems. Law, ethics, policy*, eds. Nehal Bhuta, Susanne Beck, Robin Geiß, Han-Yan Liu and Claus Kreß (Cambridge 2016), pp. 75–102.

3 Christoph Ernst, Beyond Meaningful Human Control? – Interfaces und die Imagination menschlicher Kontrolle in der zeitgenössischen Diskussion um autonome Waffensysteme (AWS), in: *Die Maschine: Freund oder Feind? Mensch und Technologie im digitalen Zeitalter*, eds. Caja Thimm and Thomas Bächle (Wiesbaden 2019), in print.

4 Cf. David Kirby, The future is now: diegetic prototypes and the role of popular films in generating real-world technological development. *Social Studies of Science* 40 (2010), pp. 41–70, here p. 41.

5 For a definition of NUIs see Yvonne Rogers, Helen Sharp and Jenny Preece, *Interaction Design. Beyond Human-Computer Interaction* (Chichester 2015), pp. 219–222, here 219.

The example to illustrate those ideas is a scene from Denis Villeneuve's *Blade Runner 2049*, in which a NUI is presented as a "diegetic prototype". In part, the implications of this scene are anticipated in the reflections on post-industrial warfare in the book *War and Anti-War* (1993) by Alvin and Heidi Toffler.

II. Looking back at post-industrial warfare

Alvin and Heidi Toffler were among the most important theorists on the post-industrial society and its relation to warfare. In 1993 they stated, "the way we make wealth and the way we make war are inextricably connected."[6] Applied to warfare, what happened in Kuwait and Iraq in the Gulf War 1991 was a symptom of what they called the "third wave" in human economic production. In the book they tried to show that the criteria of a post-industrial society could be applied not only to means of economic "production" but to military "destruction" as well. According to this premise, the Toffler's identified the following analogies between a 'post-industrial-style' of usage of information and communication technologies (ICT's) and the way the US-forces operated during the war of 1991:

1. Knowledge processed by networked computers (information) was the "central resource" of the war.[7]

2. "Value" was not created by sheer quantity of numbers (tanks, planes etc.) but as an "intangible" size which emerged from the interplay between different factors.[8]

3. The goal was to create "finer and finer precision [with, CE] more and more selectivity" in the use of force.[9]

4. Military personnel was better educated in order to operate the fielded "smart" weapons and to deal with the increasing complexity of military technology.[10]

5. Because of their education, soldiers were able to improvise in an effective way despite the confined limits of military hierarchy.[11]

6. The overall efficiency of all components (people, weapons, logistics etc.) was maximized by computers, the whole effort was (relatively) cost-efficient and provided "more bang for the buck."[12]

7. ICTs strengthened bottom-up decision-making and created the possibility for more decentralized military hierarchies (e. g. in the context of special operations).[13]

8. ICTs were merged into one gigantic complex logistic system, were every ele-

6 Alvin Toffler and Heidi Toffler, *War and Anti-War* (New York 1993), p. 73.

7 Ibid., pp. 79–82.

8 Ibid., pp. 83–84.

9 Ibid., pp. 83–85.

10 Ibid., pp. 85–88.

11 Ibid., p. 88.

12 Ibid., pp. 88–89.

13 Ibid., pp. 89–90.

ment of the war was accounted for.[14]

9. The "electronic infrastructure" was the largest created in previously known military history.[15]

10. The allied force was no longer a military "machine," but a "system with far greater internal feedback, communication, and self-regulatory adjustment capability," in short, it was a "thinking system."[16]

From hindsight, some analogies are disputable. Regarding the influence of computers, the Toffler's reproduced in part the propaganda of the US-military. However, the conclusions they drew in *War and Anti-War* are not wrong. Some aspects of them are even prophetic.[17] A good example is the chapter on "Robot Wars".[18] What is today an important debate, the Toffler's did foresee in some parts. For example, they mentioned already the problem of "humans in the loop"[19]: "[b]y extension, one can envision even more complex integrations of helicopters, ships, tanks, and ground-support planes into a single 'robotic organism' under the control of tele-operators. The imagination conjures up an all-robotic battlefield."[20] If we consider interfaces in the above mentioned sense as "diegetic prototypes," how is the scenario of a "robotic organism" depicted in current science fiction movies?

III. Imaging interfaces for future warfare

Denis Villeneuve's 2017 film *Blade Runner 2049* offers us a scene in which an automatized battlefield and the control of military force via NUIs becomes tangible (00:59:45-01:01:50).[21] The main character of the movie, K (Ryan Gosling), has been shot down with his flying car in the ruins of a destroyed city. As we learn, K's actions are under surveillance by Luv (Sylvia Hoeks), a replicant, created by Niander Wallace (Jared Leto), CEO of a powerful replicant manufacturing company. Luv operates as his right hand and is tasked with the mission to keep a watchful eye on K's actions.

In the scene, K is attacked by hostiles. Outnumbered by his attackers, suddenly precise missile strikes occur. The missiles are literally 'raining' on his opponents, killing all of them. A moment later we see Luv, sitting relaxed in an armchair, getting her nails done. Looking

14 Ibid., pp. 90–91.

15 Ibid., pp. 91–92.

16 Ibid., pp. 92–93.

17 Their analysis of the analogy between economy and warfare provided a basis for the influential 'network-centric warfare'-doctrine which was developed in the mid-1990s. See Arthur K. Cebrowski and John J. Garstka, Network-Centric Warfare: Its Origin and Future. *US Naval Institute Proceedings* 123/1 (1998), pp. 1–11.

18 Toffler and Toffler, *War and Anti-War*, pp. 125–136.

19 Ibid., p. 129. See for this discussion and the necessary literature on the subject Ernst, Beyond meaningful Human Control.

20 Toffler and Toffler, *War and Anti-War*, p. 130.

21 *Blade Runner 2049*, Denis Villeneuve, USA 2017, DVD Sony Pictures Home Entertainment.

Fig. 1: Screenshot from Blade Runner 2049, Dennis Villeneuve, USA 2017, DVD Sony Pictures Home Entertainment.

upwards in the light, she wears mixed-reality glasses. The glasses are a combination of a head-mounted-interface augmented reality interface and a voice-controlled NUI which is integrated into a setting that seems private, but is in fact her workplace. The interface is a wearable, voice control makes it multimodal. In her glasses are the events at K's site visible as a superimposition.

It is interesting to note, that the missiles come right out of the 'clouds.' While there is some debate on the web, which weapon platform is used in the scene, the whole point of the scene is to conceal the weapon system (the 'cloud'). The movie doesn't show drones, airplanes, or helicopters as the weapon-platforms. When K looks up in the air to figure out who helped him, all we get is an indexical point of light in the sky. In military terms, Luv is commanding a 'close air support'-mission (CAS). The firepower is highly precise and well-adjusted. For CAS this is important because there is, like in the scene, close contact between one's own troops and foreign troops. Furthermore, the scene depicts a low intensity conflict with irregular forces, a typical feature of the "new wars" (Herfried Münkler) since 9/11. Yet, we don't see humans at work. Instead, we can assume that automatized robotic systems are used. Why is the interface – Luv's mixed-reality glasses – interesting?

What distinguishes the interface in this scene is the absence of any form of explicit display of information- or control-elements. There is no 2D or 3D geometry visible, no coordinate system, no diagrammatic elements to organize the command & control-relation between user and the objects targeted by the weapon system. The interface is completely transparent and 'naturalized', reacting to voice command but otherwise operating independent from further human control. Luv has all time in the world and the weapon system does the work for her.

This absence of gesture-based control and visualisation of target acquisition is a remarkable feature of the interface. It reminds us of the difference between bodily engaged usage of devices, be it a

computer, be it a car, and bodily disengaged usage of automatized services, as it is e. g. the case with voice-controlled assistants like Amazon's Alexa. In the theory of traditional graphical user interfaces (GUI) 'spatialisation' was regarded as the driving factor of interface design.[22] Direct manipulation by pointing gestures is replaced in the scene by a proactive interface, which can be referred to as 'invisible computing' or even 'ambient intelligence'.[23] The AWS is selecting the targets, choses the adequate weapons, and offers this as a 'service' to Luv. This kind of self-organisation and cooperation obviously takes place in a highly integrated, automatized manner in order to relief Luv from any coordinating activities. We even can consider the interface to be part of a 'liquid operation' or 'operational flow', which is expressed in the scene by shadows of moving water all over the walls.[24] But to what extent is this interface a "diegetic prototype" for interfaces of future warfare?

The movie doesn't show us the teaming between human cognitive abilities and AI-based machinic cognitive abilities. The reality of this interaction is simply presupposed. In fact, the depicted NUI is as real as it can get at our current point in time. Such sophisticated NUIs are certainly conceivable, but are not yet ready for the mass market. To come back to Kirby's criteria, the diegetic prototype visualised in the movie shows the viability of the technology and the need for it, but not its 'benevolence'. Yet, this is exactly the point. The NUI strongly resembles a military application for a real-world interface like Microsoft's *HoloLens*-glasses. Given that, maybe it is no surprise that in November 2018, one year after the release of the film, Microsoft signed a $479 million contract with the US-military in order "to use the new HoloLens in a platform that 'provides increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and future adversaries.'"[25] In case of *Blade Runner 2049*, Hollywood was one step ahead. The movie gives us a scenario in which – on the level of interface metaphors – such an interaction between humans and automatized or even autonomous machines of war is

22 From the perspective of cultural theory see e. g. Janet H. Murray, *Inventing the medium. Principles of interaction design as a cultural practice* (Cambridge, MA 2012), Johanna Drucker, *Graphesis. Visual forms of knowledge production* (Cambridge, MA 2014).

23 José L. Encarnancao, Gino Brunetti and Marion Jähne, The interaction of humans with their intelligent environment, in: *Mensch-Computer-Interface. Zur Geschichte und Zukunft der Computerbedienung*, ed. Hans Dieter Hellige (Bielefeld 2008), pp. 281–306.

24 This flow might even be seen as a metaphor for the interface in general, as the notion of "interface" originally comes from the dynamics of liquids. See Peter Schaefer, Interface. History of a concept, 1868–1888, in: *The long history of new media. Technology, historiography, and contextualizing newness*, eds. David W. Park, Nicolas W. Jankowski and Steve Jones, (New York 2011), pp. 163–175. See for a further elaboration with regard to the idea of "conduction" Jan Distelmeyer's text in this volume.

25 April Glaser, Microsoft workers say the company is war profiteering, and they've timed their protest to hurt. *Slate* (February 2019), https://slate.com/technology/2019/02/microsoft-workers-protest-hololens-pentagon-contract.html, access: January 4, 2019, 15:30; Joshua Brustein, Microsoft wins $480 million army battlefield contract. The military plans to purchase as many as 100.000 HoloLens augmented reality devices. *Bloomberg* (November 2018), https://www.bloomberg.com/news/articles/2018-11-28/microsoft-wins-480-million-army-battlefield-contract], access: January 4, 2019, 16:30.

already a 'seamless' and 'liquid' reality. Interface-based 'teamings' between man and machines are the normal case.

Looking back at the Toffler's analogies between the Gulf War of 1991, the 'information society' and its economy it is obvious which aspects of the analysis are compatible with the movie and the particular future depicted in it. Future warfare will be a privatised service, run by the big players of the tech industry (like e. g. Microsoft). Using state of the art-NUIs, a wide range of AWS will be ready at voice command. The user, in our case Luv – a fully qualified and extremely 'smart' operator –, has not to care about the operational performance of the weapon. She can lean back and let the AWS do the work.

Certainly, the military would appreciate such a scenario. It appears, that humans are still in the 'loop'. This is a criterium to fulfil normative requirements regarding 'human' warfare in the age of AWS.[26] The only problem is, that Luv is not a human but a replicant, operating as the right hand of the company leader. Luv is, as Wikipedia informs us, a "bioengineered android".[27] This illustrates where the post-industrial situation the Toffler's described back in 1993 already has been transgressed in the fictional film – and most likely will be transgressed in reality as well. *Blade Runner 2049* gives us a hint how to imagine the future of warfare. According to the film, post-industrial society will be a 'post-human' society. The way war is conducted in a post-human society is in large parts warfare on the basis of AWS. However, this means we have to transgress the differentiation between 'operators in the loop' on the one side and 'robots' on the other side as well. And this means to challenge at least one of the premises in the Toffler's book. As an interface user, Luv is not the kind of human "tele-operator" controlling the machines the Toffler's talked about back in 1993. Neither are the 'troops' she saves. K is a replicant and he is accompanied by Joi (Ana de Armas), a holographic artificial intelligence. As a replicant, Luv is a metaphor for a new type of "smart player"[28], challenging a simple differentiation between man and machine in the process. The "thinking system" in the scene consists of man-machine-interactions, but not in the way it was imagined back in 1993. The interfaces of the future will link hybrid 'users', weaving together "human-machine assemblages".[29]

As a conclusion, we can see the significance of post-humanism for interface-theory (and of interface-theory for post-humanism). Scenarios like the one from *Blade Runner 2049* can be regarded as a reason to rethink the differentiation between humans and computers, thus re-conceptualising the understanding and relevance of interfaces for the relation between man and machine.

26 Ernst, Beyond meaningful human control.

27 Wikipedia (English), Replicant, https://en.wikipedia.org/wiki/Replicant, access: February 4, 2019, 12:00.

28 Encarnancao, Brunetti and Jähne, The interaction of humans, p 289.

29 See for further literature Suchman and Weber, Human-machine autonomies, p. 78.

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