THROUGH THE AUTISM GLASS. BEHAVIOURIST INTERFACES AND THE (INTER)ACTION ORDER

By Daniela Wentz

"Without the world becoming a sign, we do not possess it. And without the world becoming a sign, we cannot process it with a computer. In the sign, the world appears to us simultaneously as an object of cognition and of information processing. It is no wonder that the thought of artificial intelligence came up; the world constantly leads to signs. But we also have to attribute to the signs, the computational ones to begin with, the power to create the world from scratch."

– Frieder Nake

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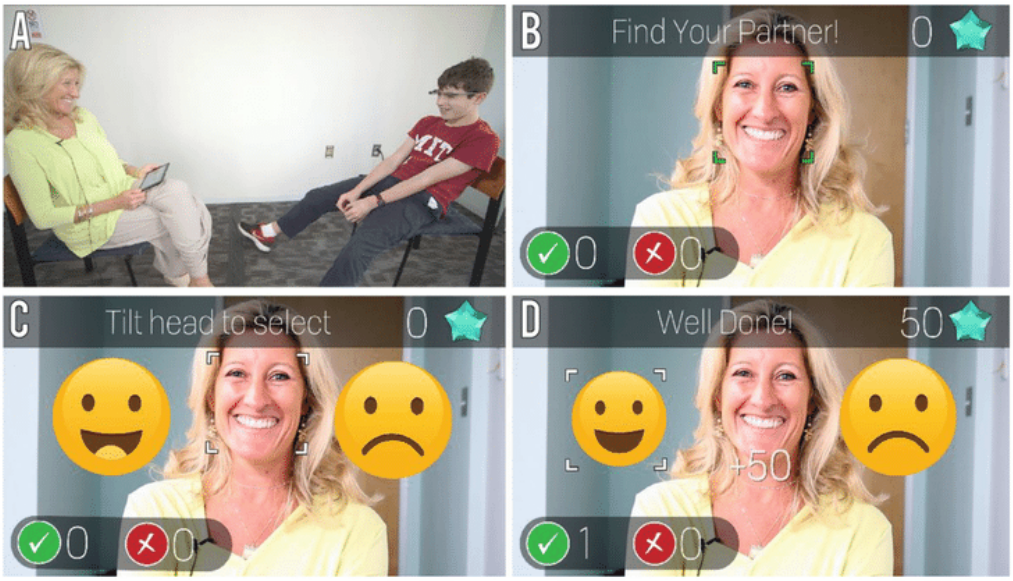

Fig. 1: Interface of Empowered Brain's App Emotion Charade, licensed under Creative Commons Attribution 4.0, Source: Vahabzadeh et al. 2018 (s. References).

Empowered Brain and *Autism Glass*, also known as *Super Power Glass*, are two marginally different digital technologies.[2] Their hardware comes in the form of Google's AR data glasses, which are equipped with software for facial recognition and emotion recognition, as well as various associated 'learning apps'. The purpose of these interfaces is for once not to enable a smooth and efficient interaction between human and machine, but literally to inter-face two humans and organise their interaction. The tools are intended to be used in the context of therapeutic interventions for neurodivergent, especially autistic people. They are designed to practice 'socio-emotional skills' such as making and maintaining eye contact with others, recognising the other person's emotions, and performing 'appropriate' forms of social interaction. What these interfaces are – or better, what they do – can be described and analysed in terms of the diagrammatic with respect to several of their qualities. Operativity, processuality, a disposition to action and to transformation prove to be essential for an understanding of both, the diagram and the interface. It is mainly, but not only, the pragmatic notion of the diagram which conceives of it as a motor and order of forms of action, which I would like to bring into play in

Quote title page: Frieder Nake, Von der Interaktion. Über den instrumentalen und den medialen Charakter des Computers, in: *Die erträgliche Leichtigkeit der Zeichen. Ästhetik, Semiotik, Informatik*, ed. Frieder Nake (Baden-Baden 1993), pp. 165–189, here p. 165 (my own translation).

2 For general information on the technologies, see the developer's websites: https://autismglass.stanford.edu/, access: July 25, 2022; https://brain-power.com/empowered-brain/, access: July 25, 2022.

this paper for some remarks on the logics and the politics of these interfaces.[3]

One of the apps on the *Empowered Brain* data glasses is called *Face2Face*. When the user looks through the glasses, she is prompted to search for a face. If a face is focused on and the gaze is held for a certain time, a progress circle around the face fills up and points are earned, the latter ones are displayed in one corner of the screen. Once the progress circle is full, the face appearing on the screen is decorated with an emoji as a reward and a star is earned. Many stars lead to the next level. Using the *Emotion Charade* app on *Empowered Brain*, the human counterpart of the wearer is instructed by means of a smartphone interface to facially depict a certain emotion. The glasses detect the face, which is signalled through small, frame-like signs, recognise the emotion portrayed and display two different emojis on the screen of the data glasses, right and left to the face, from which the wearer is supposed to select the 'correct' emoji, i.e., the one that matches the facial expression. This selection is performed through a gesture, namely tilting the head. Here, the correct reasoning is being rewarded with points and stars.

That the aesthetic appearance on the screen has diagrammatic qualities is rather obvious. Like most other GUIs found on screens of all sorts, it can be accurately described and analysed already with a rather narrowly defined concept of the diagram, which locates the diagram within a genre theory and genealogy of scientific and technical images and their systemising and organising potentials. But also the 'action' on the screen can be defined in terms of the diagrammatic. Interfaces in general and GUIs in particular may in fact emphasise an important quality of the diagrammatic still too often overlooked in the debate about the diagram as a visual or pictorial genre, which is its pragmatic dimension. The specific potential of the diagram, as Charles Sanders Peirce argues, lies not only in its illustrativeness, but also in its explorativity, that is, in its offer not only to look at what is presented to the eye, but to handle it in an operative-experimental way. Diagrams in a Peircean sense are downright designed to entail actions and follow-up actions, such as inferences. Peirce, for whom the diagram plays a key role in his semiotic epistemology, emphasises the epistemic potential of the diagram and attests it a processuality that finds expression in the so-called 'diagrammatic reasoning' he proposed.[4]

In this sense of the diagram, the interface in question here realises or is involved in a whole series of interrelat-

3 Further discussions of the technologies with concern to their genealogy (a) and modes of subjectification (b) can be found here: Daniela Wentz, Nudged to normal. Images, Behaviour and the Autism Surveillance Complex. *Digital Culture and Society* 7 (2022): 263–284; Daniela Wentz, Tales from the Loop. Autismus, Technologien und Subjektivierung. Feministische Studien 2 (2022), pp. 258–273.

4 On "diagrammatic reasoning", see for instance here: Charles S. Peirce, *Collected Papers* (8 Volumes), vols. 1–6, ed. Charles Harthorne and Paul Weiss (Cambridge, MA 1931–1935), abbreviated from now an as CP: CP 1.54; CP 2.778; CP 4.47; Charles S. Peirce, *The New Elements of Mathematics by Charles S. Peirce*, vol. 4, ed. Carolyn Eisele (The Hague and Paris 1976), pp. 313–330.

ed diagrammatic operations. First, the glasses model the face of the wearer's human counterpart as a part of the interface of interaction. For this purpose, they have to transform the face into a diagram, which then undergoes a machine learning process, which can also be described in diagrammatic terms. Every facial recognition and facial expression recognition proceeds diagrammatically. In this process, a three-dimensional image which is initially recognised as a face is transformed (usually, but not necessarily) into a two-dimensional image in which the focus is essentially on relations, such as distances or proportions between certain parts of the face. This is consistent with Peirce's notion, according to which the diagram usually omits irrelevant details, thus permitting to think more easily of the important properties.[5] The diagram thus abstracts to the relevant – he calls them intellectual – similarities between sign and object: "Many diagrams resemble their objects not at all in looks; it is only in respect to the relations of their parts that their likeness consists."[6] On this basis, in the case of facial expression recognition, the face diagram is then compared with other face diagrams stored in a database, each of which is annotated in terms of its expressed emotion. Here, the sought-after resemblance consists of certain deviations, defined as significant, from a 'neutral facial expression'. In the case of the *Emotion Charade* app, the recognised emotion on the facial interface is then again transformed into another, user-friendly emotion diagram, namely an emoji. The latter prompts the user to fulfil a similar task, which is to match "the components deemed significant"[7] with those of a second emoji and the focused face, i.e., the object of the diagram.

Besides these diagrammatic processes, even the most basic performance of this interface, the establishment of the relation between the two interaction partners, can be understood diagrammatically. In fact, interfaces and diagrams have been consistently and repeatedly described precisely as media of relationality. Just like Peirce, whose semiotic notion of the diagram I follow here, emphasises that diagrams serve primarily to establish and reveal relations, interface theorists like Brandon Hookway and Gui Bonsiepe describe interfaces first and foremost correspondingly in terms of relationality. The interface, in the words of Hookway, is "a form of relation",[8] in Bonsiepe's, it is "not a material object, it is the dimension for interaction between the body, tool and purposeful action."[9] In the context of the politics of these technologies I am interested in, this relationality is anything but

5 See for example Charles S. Peirce, "Short Logic: Chapter I. Of Reasoning in General", listed as MS 595 in the Robin Catalogue, 1895.

6 CP 2.282.

7 Ibid.

8 Brandon Hookway, *Interface* (Cambridge, MA 2014), p. 5.

9 Gui Bonsiepe, *Interface. An approach to design* (Maastricht 1999), p. 29. Also Alexander Galloway stresses the processuality and the active and activating quality of the interface: "It is always a process or a translation […] a fertile nexus." *The Interface Effect* (Cambridge 2012), p. 33.

trivial, because diagrams and interfaces do not only endow and organize relationships, but at the same time render these relationships intelligible. As Jan Distelmeyer writes: "Interfaces not only represent the threshold between humans and computers: they are at the same time an expression of how humans, computers and their mutual relationships are thought of and understood. Interfaces provide images with which we learn to look at ourselves and our computer and world context."[10] So what we learn here is that the relationship between the two interactants, as designed and expressed by the 'autism glasses', is a profoundly asymmetrical one. It entails two entirely different subject positions, one of which is considered as being deficient and one 'normal'.

What the glasses are working on, however, is not simply the bridging of those differences, but their levelling by transforming one of the interactants. The order for (inter)action the interface gives its user is very clear and entirely based on behaviourist principles. In fact, it is the digital application of B.F. Skinners experiments, the founder of radical behaviourism, on how to bring about desired behaviour and prevent unwanted behaviour by learning via consequences, i.e., rewards or punishments to certain kinds of actions, i.e., responses to stimuli. Skinner, who's philosophy has been said "to be a descendant of the pragmatism of C. S. Peirce",[11] developed his notion of "operant conditioning" or "reinforcement learning" along Peirce's pragmatic terms and his concept of habit formation. Without going into the numerous parallels and cross-connections between Peirce's pragmatism and Skinner's behaviourism here, it quickly becomes clear why Peirce's pragmatic idea, according to which "the identity of a habit depends on how it might lead us to act, not merely under such circumstances as are likely to arise, but under such as might possibly occur, no matter how improbable they may be. What the habit is depends on when and how it causes us to act", must have been an inspiration for Skinner's own reflections.[12] The meaning and politics of these interfaces, their maxim, so to speak, lies in the habits that the interaction with them is meant to train. Those habits, holding eye contact, recognise and react to facial expressions, to be formed through operant conditioning by visual nudging, rewards and repetition, comply with a wholly normative notion of social (inter)action. Ultimately, this logic makes the glasses an almost ideal illustrative example for answering the question of how (behaviourist) UX design relates to (diagrammatic) UI design. In their interplay, behavioural therapeutic strategies and goals, which have played

10 Jan Distelmeyer, *Machtzeichen. Anordnungen des Computers* (Berlin 2017), p. 21 (my own translation).

11 John Staddon, *The New Behaviorism: Mind, Mechanism, and Society* (Philadelphia, PA 2001), p. 96. For very detailed analyses of Skinner's engagement with Peirce see the works of Roy Moxley: Sources of Skinner's pragmatic selectionism in 1945. *The Behavior Analyst* 24 (2001): 201–212; Some more Similarities between Peirce and Skinner. *The Behavior Analyst* 25 (2002): 201–214.

12 CP 5.400.

the dominant role in the "treatment" of autism for decades, undergo an almost uncannily seamless automatization process.

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