Once Again, The Doorknob (2018)

On Affordance, Forgiveness and Ambiguity in Human–Computer and Human–Robot Interaction

I think it is absolutely wonderful that there is an event about affordance and an idea that this concept could be rethought.[1] I guess you invited me to talk as an artist who critically reflects on the medium she is working with. Indeed, as a net artist I do my best to show the properties of the medium, and as a web archivist and 'digital folklore' researcher, I examine the way users deal with the world they're thrown into by developers. I will address these aspects later, because it is better to start in the more applied context of human–computer interaction (HCI) and interface design, since this is where the term lives now and where it is discussed and interpreted. These interpretations affect crucial matters.

The following might sound like an introduction or a lengthy side note, but in fact it is what I really want to tell you about here. Interface design is a very powerful profession and occupation, a field where a lot of decisions are made, gently and silently. Not always with bad intentions, very often without any intention at all. But decisions are made, metaphors chosen, idioms learnt, affordances introduced – and the fact that they were just somebody's impulsive picks doesn't make them less important.

To say that design of user interfaces influences our daily life is both a commonplace and an understatement. User interfaces influence people's understanding of processes, and enable them to form relations with the companies that provide services. Interfaces define roles computer users get to play in computer culture.

I teach students who, if they don't change their mind, will become interface designers (or 'front end developers', or 'user experience (UX) designers', – there are many different terms and each of them could be a subject of investigation). I strongly believe that interface designers should not start to study by trying to make their first prototype of something that looks the same or better or different from what already exists; they shouldn't learn functions and tricks in Sketch, mastering drop shadows and rounded corners. I know, that's easy to state, but what is the alterna-

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1   This paper was delivered at the symposium "Rethinking Affordance", Akademie Schloss Solitude, Stuttgart, Germany, June 8, 2018.

tive? It would be strange to expect or demand that they study philosophy, cybernetics, Marxism, dramaturgy and arts (though all these would be very desirable) and only afterwards make their first button or gesture.

The compromise I found is to introduce them to key texts that reveal what power designers of user interfaces have and that there is no objective reality or reasoning, no nature of things, no laws, no commandments; only decisions that were and will be made consciously or unconsciously.

> *It is important for designers and builders of computer applications to understand the history of transparency, so that they can understand that they have a choice.*[2]

This quote is from the very beginning of the 2003 book *Windows and Mirrors* by Jay Bolter and Diane Gromala. Unfortunately, the book – relatively well-known in new media theory since one of the authors coined the term "remediation"[3] – is largely ignored in interface design circles. 'Unfortunately' because it questions mainstream practices based on the postulate that the best interface is intuitive, transparent … or actually no interface.

The book very much corresponds to the conference call, because it was almost exclusively artists who choose reflectivity over transparency, and these are artists who are re-thinking, re-imagining, and sometimes manage to intervene and correct the course of events.

Ten years ago, I invited my former student and artist Johannes Osterhoff to teach the basics (in our common understanding of what basics are) of interface design. You may know his witty year-long performances "Google" (2001), "iPhone live" (2012), "Dear Jeff Bezos" (2013) and other works that reflect on algorithmic and interactive regimes. For his artistic practice, Johannes calls himself an "interface artist", a quite unique self-identification.

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2   Jay David Bolter and Diane Gromala, *Windows and Mirrors: Interaction Design, Digital Art, and the Myth of Transparency* (Cambridge, MA 2003), p. 35.

3   Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA 2000).

He named his course after the book Windows and Mirrors and guided students to create projects that were all about looking at interfaces, reflecting upon metaphors, idioms and affordances.

Soon after, Johannes took the position of Senior UX Designer at SAP, one of the world's biggest enterprise software corporations (and this is also not a side note, I will come back to this fact later). So I took over the course from him a few years ago.

Where do I start with interface design in 2018?

I begin with an essay published in 1991 in Brenda Laurel's *The Art of Human-Computer Interface Design*,[4] a book that I rediscover and rediscover for myself year after year. It contains articles by practitioners who now, almost three decades later, have either turned into pop stars – heroes of the electronic age – people who were forgotten, or have been recently rediscovered. In 1990, five years after "the rest of us" had our first experience with graphical user interfaces, they convened to analyse what had gone wrong and what could be done about these mistakes.

The text I ask students to read is "Why interfaces don't work" by Don Norman. It contains statements already quoted and referenced by several generations of interface designers:

- *The problem with the interface is that there is an interface.*[5]
- *What are computers for? The user, that's what – making life easier for the user.*[6]
- *Make the task dominate, make the tools invisible.*[7]
- *The computer of the future should be invisible.*[8]

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4 Brenda Laurel (ed.), *The Art of Human–Computer Interface Design* (Boston 1990).

5 Donald Norman, Why interfaces don't work, in: *The Art of Human–Computer Interface Design*, ed. Brenda Laurel (Boston 1990), p. 210.

6 Ibid., p. 217.

7 Ibid.

8 Ibid., p. 218.

We need to aid the task, not the interface to the task. The computer of the future should be invisible. There will certainly not be separate applications and documents (programs and files). Why do we need programs and files anyway? These are artefacts of the requirements of hardware. Think about what you must do today to use computers for some task. How much is forced upon you by the technology?; how little is directly relevant to the task you are trying to accomplish?[9]

Curiously, these particular points were not typographically emphasised by the author himself but became a manifesto and mainstream paradigm for thinking about computers anyway.

In "Why interfaces don't work", sentence after sentence, metaphor after metaphor, Norman claims that users of computers are interested in whatever but not the computers themselves; they want to spend the least time possible with a computer. As a theoretician, and more importantly as a practitioner at Apple, Norman was indeed pushing the development of invisible or transparent interfaces. This is how the word "transparent" started to mean "invisible" or "simple" in interface design circles.

Sherry Turkle sums up this swift development in the 2004 introduction to her 1984 book, *The Second Self*:

> *In only a few years the "Macintosh meaning" of the word transparency had become a new lingua franca.*
> *By the mid-1990s, when people said that something was transparent, they meant that they could immediately make it work, not that they knew how it worked.[10]*

The idea that the users shouldn't even notice that there is an interface was widely and totally accepted and seen as a blessing. Jef Raskin, initiator of the Macintosh project and author of many thoughtful and oth-

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9   Ibid.

10 Sherry Turkle, *The Second Self: Computers and the Human Spirit* (Cambridge, MA 2004), p. 7.

erwise highly recommended texts, writes in the very beginning of *The Humane Interface*: "Users do not care what is inside the box, as long as the box does what they need done. [...] What users want is convenience and results."[11]

Period. No manuals or papers that would contradict. Though in practice we could see alternatives: works of media artists, discussed in the aforementioned Windows and Mirrors, and of course the Web of the 90s.

The best counterexample to users not wanting to think about interfaces is early web design, where people were constantly busy with envisioning and developing interfaces.
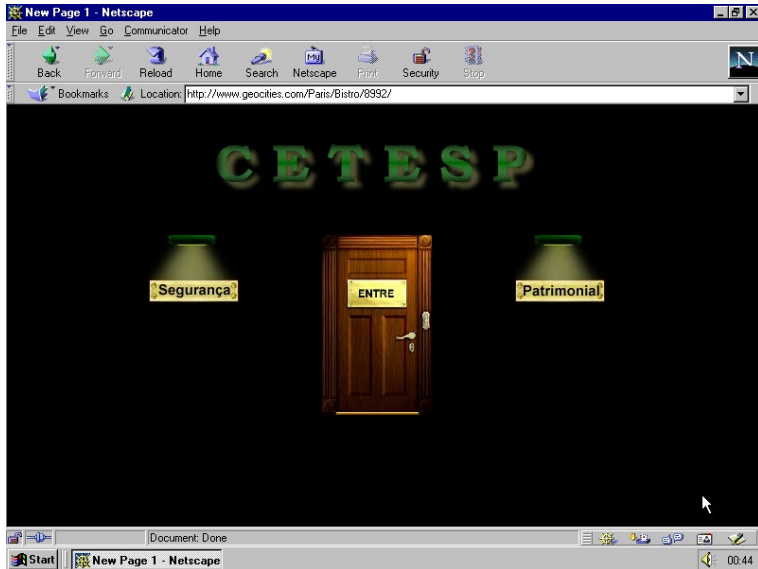

Fig. 1a (and b, c, d, e): Dragan Espenschied & Olia Lialina, Screenshot of restored GeoCities page from the One Terabyte of Kilobyte Age archive.

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11 Jef Raskin, *The Humane Interface. New Directions for Designing Interactive Systems* (Reading, MA 2000), p. 8.
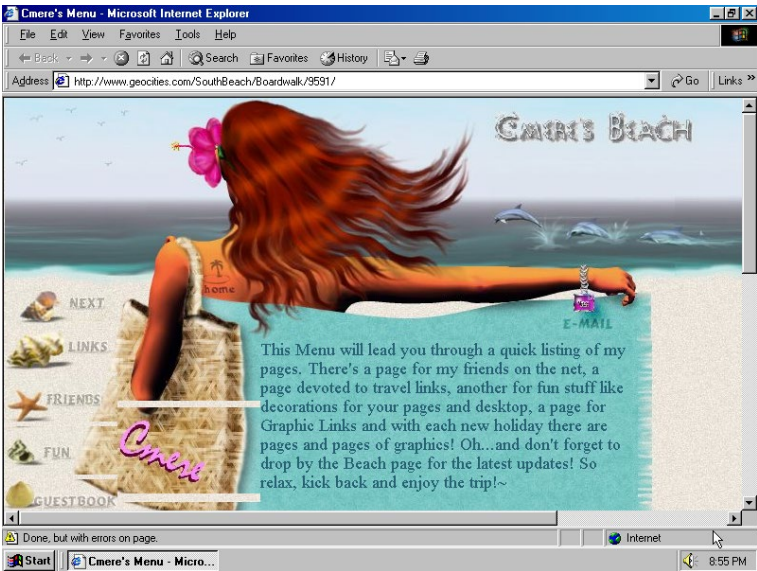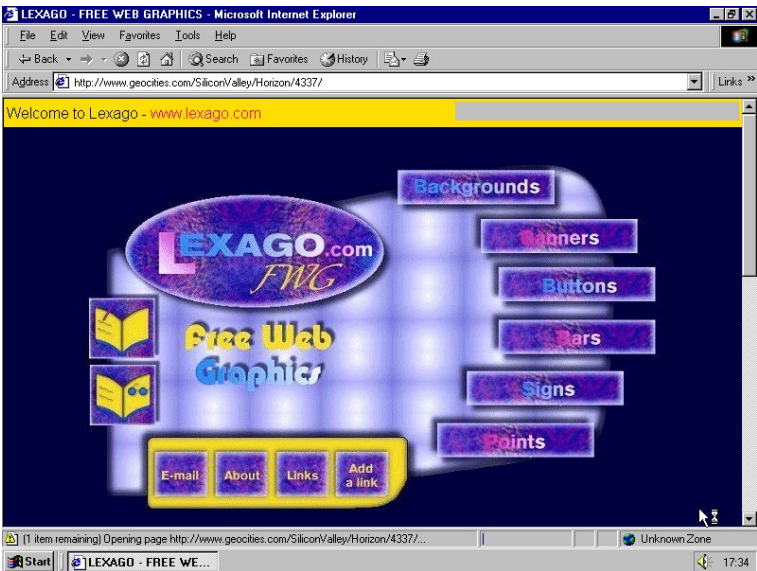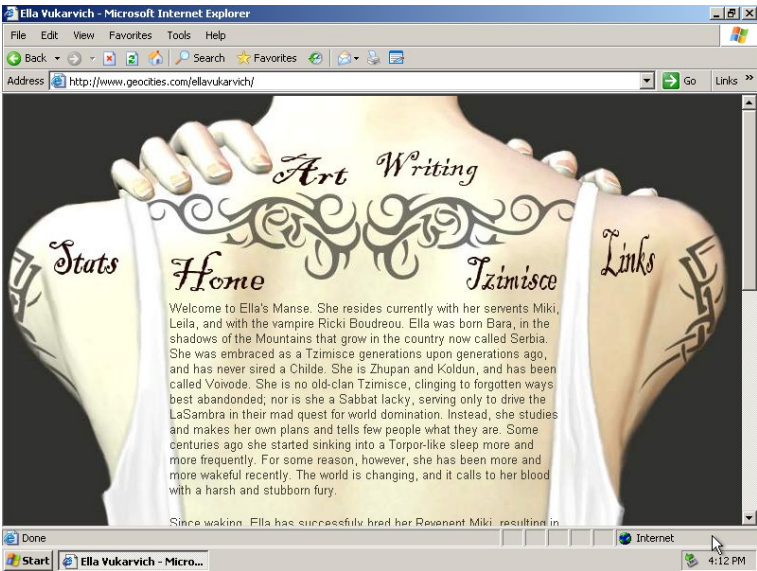
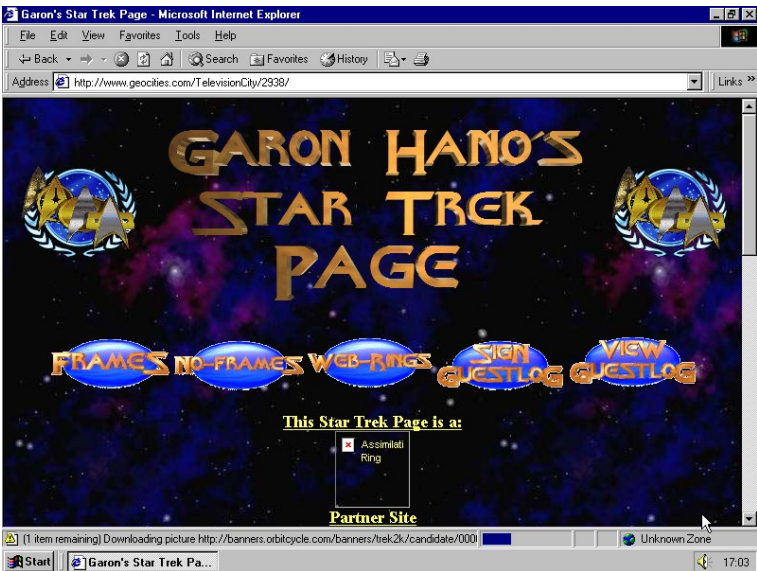Fig. 1b

Fig. 1c

Fig. 1d

Fig. 1e

Sorry, I can't stop myself from showing some examples from my One Terabyte of Kilobyte Age archive to you. I hope you can sense the people who created these pages developed against the invisibility and transparency of interfaces.

I have many more. But back to Norman: to support his intention of removing the interface from even the peripheral view of the user, he quotes himself from *Psychology of Everyday Things*[12] and lifts the doorknob metaphor from industrial design to the world of HCI:

> *A door has an interface – the doorknob and other hardware – but we should not have to think of ourselves using the interface to the door: we simply think about ourselves as going through the door or closing or opening the door.*[13]

I really don't know any mantra that has been quoted more often in interface design circles.

You can ask, if I am obviously sarcastic and disagreeing with any of the points Norman makes, why do I ask students to read this very text? The reason is the sentence that appears right after the previous quote: "The computer really is special: it is not just another mechanical device."[14]

No one ever wants to refer to this moment of weakness; already in the very next phrase Norman says that the metaphor applies anyway, and the computer's purpose is to simplify lives.

But this "not just another mechanical device" is the most important thing I like to make students aware of: the complexity and beauty of general-purpose computers. Their original purpose was not to simplify life. This is maybe a side effect sometimes. The purpose was, or could have been, the man–computer symbiosis. "The question is not 'What is the answer?' The question is 'What is the question?'",[15] Licklider quoted French philosopher

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12 Donald A. Norman, *Psychology of Everyday Things* (New York 1988).

13 Norman, Why interfaces don't work, p. 218.

14 Ibid.

15 Joseph C. R. Licklider, Man–computer symbiosis, in: *The New Media Reader*, eds. Noah Wardrip-Fruin and Nick Montfort (Cambridge, MA 2003), p. 75.

Henri Poincaré when he wrote his programmatic "Man–computer symbiosis", meaning that computers as colleagues should be a part of formulating questions.

The purpose could be bootstrapping, as in Engelbart[16] or, as Vilém Flusser formulated 1991 in his essay "Digitaler Schein"[17] (the same year as the Norman text was published!): the "Verwirklichen von Möglichkeiten",[18] the realising of opportunities. All this is quite different from 'making life easier'. One can sense that Norman's colleagues and contemporaries were not that excited about the doorknob metaphor. In a short introductory article "What's an interface", Brenda Laurel diplomatically notices that, in fact, doorknobs and doors are beaming complexity, control and power, "who is doing what to whom".[19]

The shape of the interface reflects the physical qualities of the parties to the interaction (the interactors, if you will). A doorknob is hard and firmly mounted because of the weight and the hardness of the door; it is round or handle-shaped because of the nature of the hand that will use it. The doorknob's physical qualities also reflect physical aspects of its function. It is designed to be turned so that the latch is released and so that it is easier for the user to pull the door open.

A point that is often missed is that the shape of the interface also reflects who is doing what to whom. The doorknob extends toward the user and its qualities are biased towards the hand. The door will be opened; a human will open it – the human is the agent and the door is the patient of the action. In a high-security government office I visited the other day, there was no doorknob at all. I was screened by a hidden camera and the door opened for me when I passed muster. My sense of who was in control of the interaction was quite different from the way I feel when I enter

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16 Thierry Bardini, *Bootstrapping: Douglas Engelbart, Coevolution, and the Origins of Personal Computing* (Stanford 2000), p. 24: "Engelbart took what he called 'a bootstrapping approach,' considered as an iterative and coadaptive learning experience."

17 Vilém Flusser, Digitaler Schein, in: Vilém Flusser, *Medienkultur* (Frankfurt/M. 1997), pp. 202–215.

18 Flusser, Digitaler Schein, p. 213.

19 Laurel, *The Art of Human–Computer Interface Design*, p. xii.

a room in my house. In the office, the door – representing the institution to which it was a portal – was in control.[20]

In 1992, French philosopher Bruno Latour, who according to his reference list was acquainted with Norman's writings, published "Where are the missing masses? The sociology of a few mundane artifacts".[21] The text contains the mind-blowing section "Description of the door", which canonises the door as a "miracle of technology", which "maintains the wall hole in a reversible state". Word by word his investigation of a note pinned onto a door – "The Groom Is On Strike, For God's Sake, Keep The Door Closed"– and with elaboration on every mechanical detail – knobs, hinges, grooms – he dismounts Norman's intention to perceive the doorknob as something simple, obvious and intuitive.

<p style="text-align:center">***</p>

"Why interfaces don't work" does not mention the word "affordance", but the doorknob is a symbol of it, accompanying the term from one design manual to another. And, more importantly, it was again Don Norman who among other things – or should I say, first and foremost – adapted and reinterpreted the term 'affordance', originally coined by ecological psychologist Gibson, for the world of human–computer interaction.
A very good basic summary on the topic was written by Viktor Kaptelinin with "Article on affordances" in the 2nd edition of Encyclopedia of HCI, a highly recommended resource: "Affordance is […] considered a fundamental concept in HCI research and described as a basic design principle in HCI and interaction design."[22] Affordance as in Norman, not in Gibson.

20 Ibid.

21 Bruno Latour, Where are the missing masses?, in: *Shaping Technology / Building Society: Studies in Sociotechnical Change*, eds. Wiebe E. Bijker et al. (Cambridge, MA 1994), pp. 225–259.

22 Victor Kaptelinin, Affordances, in: *The Encyclopedia of Human–Computer Interaction* (Interaction Design Foundation); https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/affordances, accessed July 28, 2018.

Gibson's Affordances:[23]

- Offerings or action possibilities in the environment in relation to the action capabilities of an actor
- Independent of the actor's experience, knowledge, culture or ability to perceive
- Existence is binary – an affordance exists or it does not exist

Norman's Affordances:[24]

- Perceived properties that may or may not actually exist
- Suggestions or clues as to how to use the properties
- Can be dependent on the experience, knowledge, or culture of the actor
- Can make an action difficult or easy

The difference is properly explained in a widely quoted table from "Affordances: Clarifying and evolving a concept" by Joanna McGrenere and Wayne Ho, written in 2000.[25] The authors summarise the shift: "Norman […] is specifically interested in manipulating or designing the environment" so that utility can be perceived easily."

… or vice versa …

"Unlike Norman's inclusion of an object's perceived properties, or rather, the information that specifies how the object can be used, a Gibsonian affordance is independent of the actor's ability to perceive it."[26]

As we know, Don Norman later admitted[27] to misinterpreting the term, corrected it to "perceived affordances", and apologized for starting the mess and devaluation of the term.[28]

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23 Cf. ibid.

24 Cf. ibid.

25 Joanna McGrenere and Wayne Ho, Affordances: Clarifying and evolving a concept, in: *Proceedings of the Graphics Interface 2000 Conference* (Montréal 2000), p. 8.

26 McGrenere and Ho, Affordances, p. 3.

27 Don Norman, Affordances and design (2008); https://jnd.org/affordances_and_design/, accessed January 20, 2021.

28 That should remind us of another term that has existed in HCI since 1970, at least at Xerox PARC lab: "user illusion", which at the end of the day is the same principle, and also a foundation of interfaces as

Far too often I hear graphic designers claim that they have added an affor-dance to the screen design when they have done nothing of the sort. Usually, they mean that some graphical depiction suggests to the user that a certain action is possible. This is not affordance, either real or perceived. Honest, it isn't. It is a symbolic communication, one that works only if it follows a convention understood by the user.[29]

Almost 20 years later, as the community has grown, claims have become even more ridiculous, with the word "affordance" being used by UX designers in all possible meanings, as a synonym for whatever.

When I started to work on this lecture, Medium.com, which always knows what I am interested in at the moment, delivered to me a fresh 11 minutes read on uxplanet.org: How to use affordances in UX.[30] Already the title indicates confusion, but not to the author, who obviously thinks that affordance is an element of an app and it can be used as a synonym for Menu, Button, Illustration, Logo, or Photo. The article references a three-year-old text[31] laying out six rather absurd types of affordances: explicit, hidden, pattern, metaphorical, false, and negative.

This terminological mess is nothing new for the design discipline; also, the word "affordance" and its usage are not the biggest deal. There are other terms at stake and their usage is more troubling, such as "transparency" or "experience". Maybe this affordance clownery could be ignored or could even be seen positively as a commendable attempt to bring sense into a world of clicking, swiping and drag-and-dropping; a good intention to

we know them. "At PARC we coined the phrase 'user illusion' to describe what we were about when designing user interfaces." See Alan Kay, User interface: A personal view, in: *The Art of Human–Computer Interface Design*, ed. Brenda Laurel (Reading, MA 1990), pp. 191–207.

29 Don Norman, Affordance, conventions and design (Part 2) (2018); https://jnd.org/affordance_conventions_and_design_part_2/, accessed August 20, 2018.

30 Tubik Studio, UX Design glossary: How to use affordances in user interfaces, UX Planet (2018); https://uxplanet.org/ux-design-glossary-how-to-use-affordances-in-user-interfaces-393c8e9686e4, accessed January 20, 2021.

31 Paula Borowska, 6 Types of digital affordance that impact your UX, Webdesigner Depot (2015); https://www.webdesignerdepot.com/2015/04/6-types-of-digital-affordance-that-impact-your-ux/, accessed January 20, 2021.

contextualise them in order to interpret them through psychology and philosophy.

But I'd also like to mention that this urge to talk about and define affordances is not so innocent, with affordance being a cornerstone of the HCI paradigm user-centred design – which was coined[32] and conceptualised by (again!) Don Norman in the mid 1980s – as well as the user experience bubble that (again!!) Don Norman started.[33] Both blew up in 1993 when he became head of research at Apple. User experience or UX swallowed other possible ways to see what an interface is and how it could be.

In my essay "Rich user experience, UX and desktopization of war",[34] I wrote about the danger of scripting and orchestrating user experiences, in "Turing complete user"[35] I mention that it is very difficult to criticise the concept, because it has developed a strong aura of doing the right thing, of "seeing more", "seeing beyond", etc.

I asked the aforementioned Johannes Osterhoff about his interpretation of UX. He replied:

> *When I say UX I usually mean the processes that I set up so that a product meets customer's (i.e. users') needs. Processes because usually I deal with complicated tools that take a long time to develop and refine – much beyond an initial mock-up and quick subsequent implementation. […] I mean the interplay of measures that have to be taken to enhance a special piece of software [in] the long run: this involves several disciplines such as user research, usability testing, interaction design, information visualization, prototyping, scientific*

32 User-centered design, Wikipedia; https://en.wikipedia.org/wiki/User-centered_design, accessed July 24, 2018.

33 "I invented the term because I thought human interface and usability were too narrow. I wanted to cover all aspects of the person's experience with the system including industrial design graphics, the interface, the physical interaction and the manual. Since then, the term has spread widely, so much so that it is starting to lose its meaning." Norman in Peter Merholz, Peter in conversation with Don Norman about UX & innovation, Adaptive Path; https://web.archive.org/web/20181112043020/http://www.adaptivepath.com/ideas/e000862/, accessed July 29, 2018.

34 Olia Lialina, Rich user experience, UX and desktopization of war; http://contemporary-home-computing.org/RUE/ (2015); accessed January 20, 2021; published in this volume, pp. 40–64.

35 Olia Lialina, Turing complete user (2012); http://contemporary-home-computing.org/turing-complete-user/, accessed January 20, 2021; published in this volume, pp. 12–37.

and cultural research, and some visual design. In a big software company, strategy and psychology [are] part of this, too. And also streams of communication; which form and frequency is adequate, what works in cross-located teams and what does not.[36]

Another former student, Florian Dusch, principal of the software design and research company zigzag in Stuttgart, when answering my question, also refers to UX as "many things", "holistic", and "not only pretty images": "We're working hard with our clients to make them understand that UX is not only pretty images, but a holistic user-centred approach to building products. There's a nice video from Don Norman on that."[37]

The next quote is from *The Best Interface is No Interface*,[38] a very expressive book brought to the world in 2015 by Golden Krishna who "currently works at Google on design strategy to shape the future of Android":

This is UI:

Navigation, subnavigation, menus, drop-downs, buttons, links, windows, rounded corners, shadowing, error messages, alerts, updates, checkboxes, password fields, search fields, text inputs, radio selections, text areas, hover states, selection states, pressed states, tooltips, banner ads, embedded videos, swipe animations, scrolling, clicking, iconography, colors, lists, slideshows, alt text, badges, notifications, gradients, pop-ups, carousels, OK/Cancel, etc. etc. etc.

This is UX:

People, happiness, solving problems, understanding needs, love, efficiency, entertainment, pleasure, delight, smiles, soul, warmth, personality, joy, satisfaction, gratification, elation, exhilaration, bliss, euphoria, convenience, enchantment, magic, productivity, effectiveness, etc. etc. etc. [39]

36   Johannes Osterhoff to Olia Lialina, June 3, 2018.
37   Florian Dusch to Olia Lialina, June 2, 2018.
38   Golden Krishna, *The Best Interface Is No Interface: The Simple Path to Brilliant Technology* (Berkeley 2015), p. 47.
39   Golden Krishna, Golden Krishna; https://www.goldenkrishna.com, accessed January 20, 2021.

The German academic Marc Hassenzahl also delivers a wonderful definition of UX with the following introduction of himself on his website: "He is interested in designing meaningful moments through interactive technologies – in short: Experience Design."[40] Already from this small selection of quotes by people who have been in the business for a long time and know what they do, you can sense that UX is big, big and good, bigger and better than … small-minded and petty things.

The paradox is that technically, when it comes to practice, products of user experience design are contradicting its image and aura. UX is about nailing things down, it has no place for ambiguity or open-ended processes.

Marc Hassenzahl is contributing to the scene not only through poetic statements and interviews. In fact, in his 2010 book *Experience Design: Technology for All the Right Reasons*, he proclaims "the algorithm for providing the experience"[41] in which the "why" is a crucial component, a hallmark that justifies UX's distinguished position.
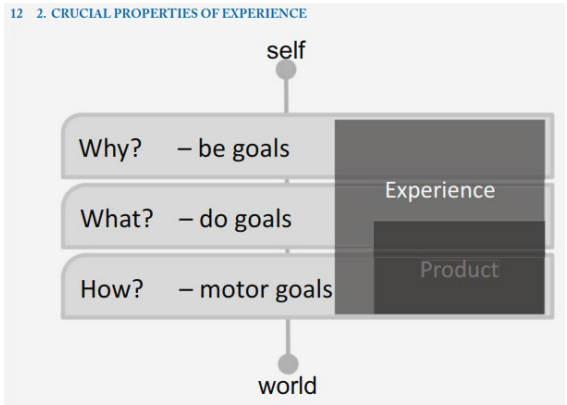

Fig. 2: Marc Hassenzahl and John Carroll, *Experience Design: Technology for All the Right Reasons* (San Rafael 2010), p. 12.

40 Marc Hassenzahl, Experience Design (2016); https://hassenzahl.wordpress.com, accessed July 30, 2018.
41 Marc Hassenzahl and John Carroll, *Experience Design: Technology for All the Right Reasons* (San Rafael 2010), p. 12.

In a series of video interviews[42] Hassenzahl recorded with the Interaction Design Foundation, he states that people don't just want to make a phone call, there are different reasons behind each of them: business, goodnight kiss, checking if a child is at home, ordering food. And all those 'whys' need their own design on both the software and the hardware level. Again, an ideal UX phone is a different phone for each need or at least a different app for different types of calls.

The why of UX is not a philosophical, but a pragmatic question, that could be substituted with "what exactly?" and "who exactly?".

User experience design is a successful attempt to overcome the historic accident Don Norman makes responsible for difficult-to-use interfaces of the late 1980s: "We have adapted a general purpose technology to very specialized tasks while still using general tools."[43]

Here is a fresh insight from the studio UX Collective on how to train your UX skills: "It's a good idea to limit yourself by imposing some assumptions, constraints, and a platform (mobile / desktop / tablet etc). If working in pairs, one person could pick a problem, and the partner could refine it. So choose one of the following, decide on a mobile or desktop solution, and then keep asking questions."[44]

The list has 100 suggestions, here are a few:

> *20. Create an alarm clock.*
> *21. Create an internal tool that allows a major TV network to tag and organize their content.*
> *22. Create a time tracker.*
> *23. Create a chat-bot for financial decisions.*
> *24. Create a music player.*

42 Marc Hassenzahl, User experience and experience design, in: User Experience and Experience Design (Interaction Design Foundation); https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/user-experience-and-experience-design, accessed July 28, 2018.

43 Norman, Why interfaces don't work, p. 218.

44 Jon Crabb, 100 Example UX problems, UX Collective (2018); https://uxdesign.cc/100-example-ux-problems-f90e7f61dd9f?gi=99b943a95614, accessed January 20, 2021.

25. Create a smart mirror.

26. Prompt the user to engage in a daily act of kindness.

27. Track your health with some kind of wearable tech.

28. Locate your locked bike and be informed if it moves.

29. Prevent your parked car from being stolen while you go on holiday.

30. Build a smart fridge.[45]

"We can design in affordances of experiences"[46] said Norman in 2014. What a poetic expression if you forget that "affordance" in HCI means immediate unambiguous clue, and "experience" is an interface scripted for a very particular narrow scenario.

There are many such examples of tightly scoped scenarios around. To name one that gets public attention right at the moment – early May 2018 in the middle of the Cambridge Analytica scandal – Facebook announces an app for long-term relationships:[47] Real long-term relationships – not just "hook-ups", to quote Mark Zuckerberg. If you are familiar with my position on general-purpose computers and general-purpose users, you know that I believe there should be no dating apps at all; not because I am against dating, but because I think that people can date using general-purpose software, they can date in email, in chats, you can date in Excel and Etherpad. But if the free market demands a dating software, it should be made without asking "why?" or "what exactly?", "hook-up or long-term relationship?", etc.

Please allow me again to show a screenshot or two of old web pages. I have a "before_" category in the One Terabyte of Kilobyte Age archive, which I assign to pages that authors created with a certain purpose

45 Ibid.

46 Don Norman, Commentary by Donald A. Norman, in: *The Encyclopedia of Human–Computer Inter-action* (Interaction Design Foundation); https://www.interaction-design.org/literature/book/the-ency-clopedia-of-human-computer-interaction-2nd-ed/user-experience-and-experience-design#heading_Commentary_by_Donald_A_Norman_page_100758, accessed July 28, 2018.

47 Sam Machkovech, Mark Zuckerberg announces Facebook dating. *Ars Technica* (2018); https://ars-technica.com/information-technology/2018/05/mark-zuckerberg-announces-facebook-dating/, accessed January 20, 2021.

in mind, which nowadays are taken over by industrialised, centralised tools and platforms. The first category is before_flickr, the next before_ googlemaps. The last one reminds me of ratemyprofessors.com, so I tagged it before_ratemyprofessor. These pages are dead and none of them became successful, but they are examples of users finding their ways to do what they desire in an environment that is not exclusively designed for their goals: this is what I would call a true user experience. It is totally against the ideology of UX.
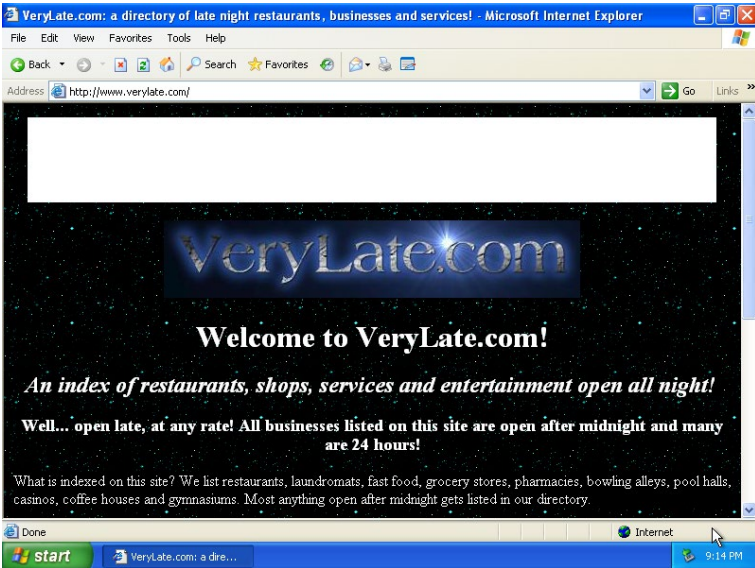

Fig. 3a (and b, c): Dragan Espenschied & Olia Lialina, Screenshot of restored GeoCities page from the One Terabyte of Kilobyte Age archive.
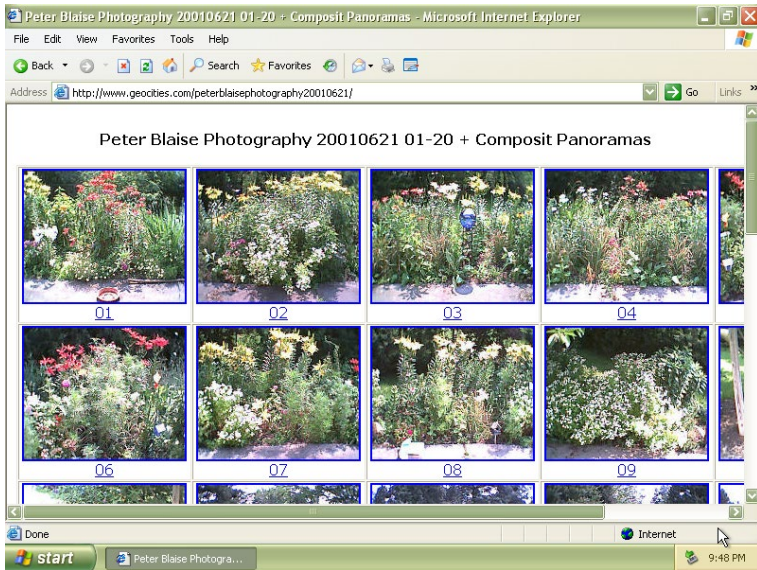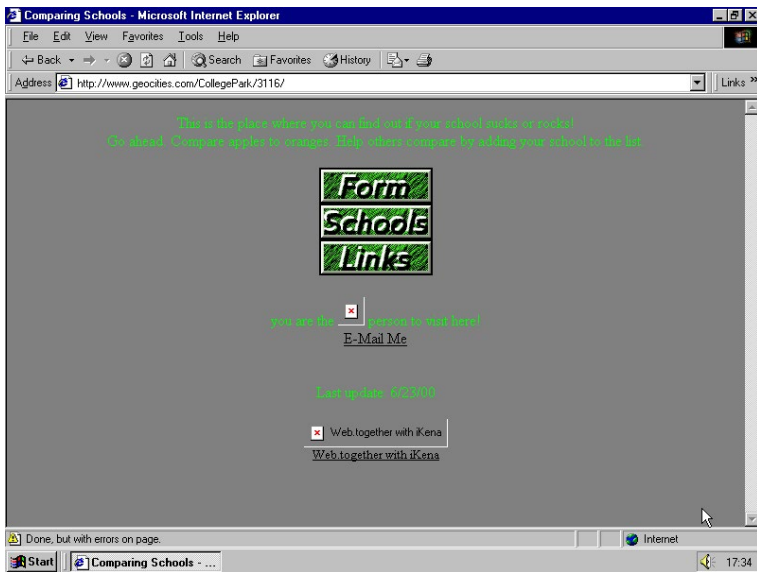
Fig. 3b

Fig. 3c

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So, apart from contradicting Don Norman's call and saying that computers of the future should be visible, I'd like to suggest finally disconnecting the term "affordance" from Norman's interpretation, to disconnect affordance from experience, from the ability to perceive (as in Gibson), and from experience design needs; to see affordances as options for possibilities of action, and to insist on the general-purpose computer's affordance to become anything if you are given the option to program it; to perceive opportunities and risks of a world that is not limited to mechanical age laws and artefacts.

In the chapter on affordance, the authors of the influential interaction design manual *About Face* – which for many years was subtitled "the essentials of interaction design', and which in the latest edition changed to "classic of creating delightful user experiences" – observe:

> *A knob can open a door because it is connected to a latch. However, in a digital world, an object does what it does because a developer imbued it with the power to do something [...]. On a computer screen though, we can see a raised three-dimensional rectangle that clearly wants to be pushed like a button, but this doesn't necessarily mean that it should be pushed. It could literally do almost anything.[48]*

Throughout the chapter, designers are advised to resist this opportunity and to be consistent and follow conventions. Because indeed everything is possible in the world of zeroes and ones, they introduce the notion of a "contract": "When we render a button on the screen we are making a contract with the user [...]."[49]

48 Alan Cooper, Robert Reimann and David Cronin, *About Face 3: The Essentials of Interaction Design* (Indianapolis 2007), p. 284.
49 Ibid., p. 285.

If there is a button on screen it should be pressed, not dragged-and-dropped, and should respond accordingly. And they are absolutely right … but only when the interface is limited to knobs and buttons.

When Bruno Latour wanted his readers to think about a world without doors, he wrote:

> *[I]magine people destroying walls and rebuilding them every time they wish to enter or leave the building […] or the work that would have to be done to keep inside or outside all the things and people that left to themselves would go the wrong way.*[50]

A beautiful thought experiment, and indeed unimaginable – however, not in a computer-generated world where we don't need doors really. You can go through walls, you can have no walls at all, you can introduce rules that would make walls obsolete. These rules and contracts – not behaviours of knobs – are the future of user interfaces, so we have to be very thoughtful about the education of interface designers.

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There are two more concepts I promised in the title but haven't yet addressed: forgiveness and human–robot interaction (HRI). My questions are: How does the preoccupation with strong clues and strictly bound experiences – affordance and UX – affect the beautiful concept of "forgiveness", which theoretically would have to be a part of every interactive system? And how do concepts of transparency, affordance, form follows function, form follows emotion,[51] user experience, and forgiveness refract in HRI?

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50 Freeman J. Dyson et al., *Technology and Society: Building Our Sociotechnical Future*, eds. Deborah G. Johnson and Jameson Wetmore (Cambridge, MA 2008), p. 154.

51 Form follows emotion is a credo of German industrial designer Hartmut Esslinger, which became a slogan for frog, the company he founded in 1969. See: Frog Design, About Us; https://www.frogdesign.com/culture, accessed August 18, 2018; Owen Edwards, Form follows emotion, Forbes (1999); https://

I'll start with forgiveness. The following is a quote from Apple's 2006 "Human interface guidelines", which I think gives a very good idea of what exactly is meant by forgiveness when it comes to user interfaces.

> **Forgiveness**
>
> *Encourage people to explore your application by building in forgiveness – that is, making most actions easily reversible. People need to feel that they can try things without damaging the systems or jeopardizing their data. Create safety nets, such as Undo and Revert to Saved commands, so that people will feel comfortable learning and using your product.*
>
> *Warn users when they initiate a task that will cause irreversible loss of data. If alerts appear frequently, however, it may mean that the product has some design flaws. When options are presented clearly and feedback is timely, using an application should be relatively error-free.*
>
> *Anticipate common problems and alert users to potential side effects. Provide extensive feedback and communication at every stage so users feel that they have enough information to make the right choices. For an overview of different types of feedback you can provide, see "Feedback and Communication" (page 42).*[52]

Its essence is making actions reversible, offering users stable perceptual cues for a sense of "home", and always allowing "Undo".

In 2015 Bruce Tognazinni and Don Norman noticed that forgiveness as a principle vanished from Apple's guidelines for iOS and wrote the angry article "How Apple is giving design a bad name".[53] Bruce Tognazinni himself has authored eight editions of Apple's "Human interface design

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www.forbes.com/asap/1999/1112/237.html, accessed August 18, 2018.

52 Apple Human interface guidelines (Apple Computer Inc., 2006), p. 45.

53 Bruce Tognazzini and Don Norman, How Apple is giving design a bad name. *Fast Company* (2015); https://www.fastcompany.com/3053406/how-apple-is-giving-design-a-bad-name, accessed January 20, 2021.

guidelines", starting in 1978,[54] and is known for conceptualising interface design in the context of illusion and stage magic.
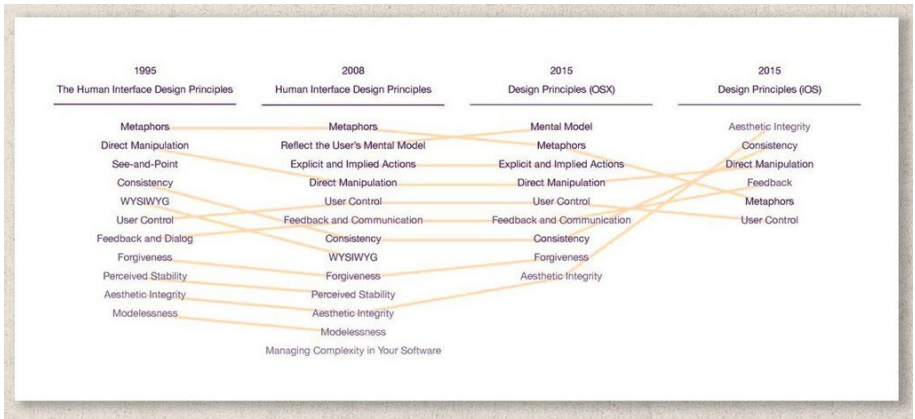

Fig. 4: Diagram tracing the changes in core principles of Apple's guidelines over time, by Michael Meyer.

Users of both Apple, Android, and all other mobile phones without keyboards noticed the disappearance of forgiveness even earlier, because there was no equivalent to ⌘-Z or Ctrl-Z on their devices. They noticed but didn't protest.

In my view of the world, Undo should be a constitutional right. It is the top demand in my project, User Rights.[55] In addition to the many things I said in support of Undo elsewhere, in the context of this talk I'd like to emphasise that all the hype around affordances and UX developed in parallel with the disappearance of Undo – this is not a coincidence. Single-purpose applications with one button per screen would guide through life without a need for Undo.

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54 See: Bruce Tognazzini, About Tog, AskTog (2012); https://asktog.com/atc/about-bruce-tognazzini/, accessed January 20, 2021.

55 Olia Lialina, User Rights website; https://userrights.contemporary-home-computing.org, accessed January 20, 2021.

Fig. 5: Metez, Teja. 'External Undo Button'. Undo – Reloaded, 2015.

Though what users really need from operating system vendors is a global Undo function. It could have been the only contract, we could have had a world where further discussions about affordances would be obsolete.

<div align="center">***</div>

Being part of New Media dynamics, the field of HCI is very vibrant and very "pluralistic". Tasks for interface designers are to be found far beyond the screens of personal computers and submit buttons. There are new challenges like virtual reality and augmented reality, conversation and voice user interfaces, even brain computer Interaction. All these fields are not new by themselves, they are contemporaries of graphical user interfaces (GUI), and by calling them new I rather mean "trending right now" or "trending right now again" in HCI papers and in mass media.

The last few years were all about artificial intelligence, neural networks and anthropomorphic robots, in movies, literature, and consumer products. I adjusted my curriculum as well and introduced rewriting an ELIZA[56] script to my interface design course, so that students prepare themselves for designing interfaces that talk to the users and pretend that they understand them. I personally have a bot,[57] and this talk will be fed to its algorithm and will become a part of the bot's performance. Some more years and this bot might be injected into a manufactured body looking something like me and will go to give lectures in my place.

Watching films and TV series where robots are main protagonists, following Sophia's[58] adventures in the news, regular people dive into issues that were considered exotic only a short time: the difference between symbolic and strong AI, ethics of robotics, trans-humanism.

The omnipresence of robots, even if just mediated, provokes delusions: "We expect our intelligent machines to love us, to be unselfish. By the same measure we consider their rising against us to be the ultimate treason."[59] (Zarkadakis)

Delusions lead to paradoxes: "Robots which enchant us into increasingly intense relationships with the inanimate, are here proposed as a cure for our too-intense immersion in digital connectivity. Robots, the Japanese hope, will pull us back toward the physical real and thus each other."[60] (Turkle)

Paradoxes lead to more questions: "Do we really want to be in the business of manufacturing friends that will never be friends?"[61] (Turkle)

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56 N. Landsteiner, Eliza (Elizabot.Js), mass:werk (2005); https://www.masswerk.at/elizabot/, accessed January 20, 2021.

57 Olia Lialina, GIFmodel_ebooks – Twitter bot, 2015; https://twitter.com/GIFmodel_ebooks, accessed January 20, 2021.

58 Hanson Robotics; https://www.hansonrobotics.com, accessed January 20, 2021.

59 George Zarkadakis, *In Our Own Image: Savior or Destroyer? The History and Future of Artificial Intelligence* (New York 2017), p. 51.

60 Sherry Turkle, *Alone Together: Why We Expect More from Technology and Less from Each Other* (New York 2012), p. 147.

61 Ibid., p. 101.

Should robots have rights? Should robots and bots be required to reveal themselves as what they are?

The last question suddenly entered the discourse after Google's recent demo of Duplex,[62] causing Internet users to debate whether Google's assistant should be allowed to say "hmmm", "oh", "errr", or to use interjections at all.

Fig. 6: ITU Pictures. Sofia, First Robot Citizen at the AI for Good Global Summit 2018. May 15, 2018.

Without even noticing, we, the general public, are discussing not only ethical but interface design questions and decisions. And I wish or hope it will stay like this for some time.

Why Is Sophia's (robot) head transparent?[63]

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62 Jeffrey Grubb, Google Duplex: A.I. assistant calls local businesses to make appointments; https://www.youtube.com/watch?v=D5VN56jQMWM, accessed July 28, 2018.

63 Why is Sophia's (robot) head transparent? Quora thread, 2018; https://www.quora.com/Why-is-Sophi-as-robot-head-transparent, accessed January 20, 2021.

Users ask the Internet another design question: Is it just to look like *Ex Machina*, or is it for better maintenance? Or maybe it marks a comeback of transparency in the initial, pre-Macintosh meaning of the word?

Curiously, when scientists and interaction designers talk about transparency at the moment, they oscillate between meaning exposing and explaining algorithms and the simplicity of communication with a robot:

Designing and implementing transparency for real time inspection of autonomous robots[64]

Robot transparency: Improving understanding of intelligent behaviour for designers and users[65]

Improving robot transparency: real-time visualisation of robot AI substantially improves understanding in naive observers[66]

The researcher Joanna J. Bryson – co-author of the aforementioned papers – has a very clear position on ethics. "Should robots have rights?" is not a question for her. Instead, she asks why design machines that raise such questions in the first place.[67]

However, there are enough studies proving that humanoids (anthropomorphic robots) that perform morality are the right approach for situations where robots work with and not instead of people: the social robot scenario, where "social robot is a metaphor that allows human like com-

64 Andreas Theodorou, Robert H. Wortham and Joanna J. Bryson, Designing and implementing transparency for real time inspection of autonomous robots. *Connection Science* 29 (2017), pp. 230–241.

65 Robert H. Wortham, Andreas Theodorou and Joanna J. Bryson, Robot transparency: Improving understanding of intelligent behaviour for designers and users. Towards Autonomous Robotic Systems: 18th Annual Conference, TAROS, Guildford, UK, July 19–21, 2017.

66 Robert H. Wortham, Andreas Theodorou and Joanna J. Bryson, Improving robot transparency: real-time visualisation of robot AI substantially improves understanding in naive observers. IEEE RO-MAN 2017: 26th IEEE International Symposium on Robot and Human Interactive Communication, Lisbon, Portugal, Aug 28–Sep 1, 2017.

67 See: Theodorou, Wortham and Bryson, Designing and implementing.

munication patterns between humans and machines".[68] This is quoted from Frank Hegel's article "Social robots: Interface design between man and machine", a text that truly impressed me some time ago, though it doesn't announce anything revolutionary; on the contrary, it states quite obvious things like "human-likeness in robots correlates highly with anthropomorphism"[69] or "aesthetically pleasing robots are thought to possess more social capabilities […]."[70]

Very calmly, almost in between the lines, Hegel introduces the principle for a proper fair robot design: the "fulfilling anthropomorphic form",[71] which should immediately lead humans to understand a robot's purpose and capabilities. Affordance for a new age.

Robots are here: they are not industrial machines, but social, or even "lovable"; their main purpose is not to replace people, but to be among people. They are anthropomorphic, they look more and more realistic. They have eyes … but not because they need them to see. Their eyes are there to inform us that seeing is one of the robot's functions. If a robot has a nose it is to inform the user that it can detect gas and pollution, if it has arms it can carry heavy stuff; if it has hands it is to grab smaller things, if these hands have fingers, you expect it can play a musical instrument. Robots' eyes beam usability, their bodies express affordances. Faces literally become an interface.

Back to Norman's wisdom:

> *Affordances provide strong clues to the operations of things. Plates are for pushing. Knobs are for turning. Slots are for inserting things into. Balls are for throwing or bouncing. When affordances are taken advantage of, the user knows what to do just by looking: no picture, label, or instruction needed.*[72]

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68 Frank Hegel, Social robots: Interface design between man and machine, in: *Interface Critique*, eds. Florian Hadler and Joachim Haupt (Berlin 2016), p. 104.

69 Ibid., p. 111.

70 Ibid., p.112.

71 Ibid., p. 106.

72 Mads Soegaard, Affordances; https://www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction/affordances, accessed July 30, 2018.

Manual affordances ("strong clues") are easy to comprehend and accept when they are part of a GUI: they are graphically represented and located – somewhere – on screen. Things got more complex for designers and users when we moved to so-called "post GUI", to gestures in virtual, augmented and invisible space. Yet this cannot be compared with the astonishing level of complexity when our thoughts move from human–computer interaction to human–robot interaction.

The image on the next page is from a selection of students' sketches; I asked them to embrace the principle of fulfilling the anthropomorphic form and take it to the limit. What could an anthropomorphic design be if everything that doesn't signal a function is removed? For example, if the robot can't smell there is just no nose. And why have two hands if you only need one? What could this un-ambiguity mean for interaction and product design?

And finally: How is the HCI principle of forgiveness faring in HRI? In contrast to the current situation in graphical and touch-based user interfaces, forgiveness is doing very well in the realms of robots and AI.

It is built in: "[t]he external observer of an intelligent system can't be separated from the system."[73] Robot companions are here "[n]ot because we have built robots worthy of our company but because we are ready for theirs" and "[t]he robots are shaping us as well, teaching us how to behave so they can flourish."[74] These quotes from Turkle and Zarkadakis remind us of Licklider's man–computer symbiosis, Engelbart's concept of bootstrapping, and other advanced projections for the coexistence of man and computer, it's just that this time it is about man and robot, not man and computer-on-the-table situations.

73 Zarkadakis, *In Our Own Image*, p. 71.
74 Turkle, *Alone Together*, p. 55.

Fig. 7: Andreas Eisenhut, Concept for swimming lifesaver robot. Video still, June 2018.

Forgiveness is in-built, but in HRI it is built into the human element. It is all on our side.

We are witnessing how the most valuable concept of HCI – Undo – meets a fundamental principle of symbolic AI – scripting the human interactor.[75] I'm curious to see what affordances will further emerge. And who will undo whom when symbolic AI is replaced by a "Strong" or "Real" AI, as it's now called.

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75 "A successful chatterbot author must therefore script the interactor as well as the program, must establish a dramatic framework in which the human interactor knows what kinds of things to say […]" Janet H. Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (New York 1997), p. 202.