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From Me to All of Us, and Back Again: Algorithmic Feedback Loops in Contemporary Art

Marijke Goeting
Radboud University Nijmegen, ArtEZ Institute of the Arts

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I. Introduction: A One-Way Mirror

Perpetual motion device, latest fashion, youporn, 3 diseases caused by bacteria, the face of the algerian resistance, penthouse pet of the month, mass media censorship, how to end an unhealthy friendship, persian kitty. This is just an infinitesimal selection of search queries that are captured by British artist duo Thomson & Craighead in their online artwork *Beacon* (2005-present).[1] The work is a straightforward-looking Web page with a search box that continuously relays randomly selected live web searches from around the world at a speed of 1.5 seconds per query.[2] (Fig. 1) It takes its

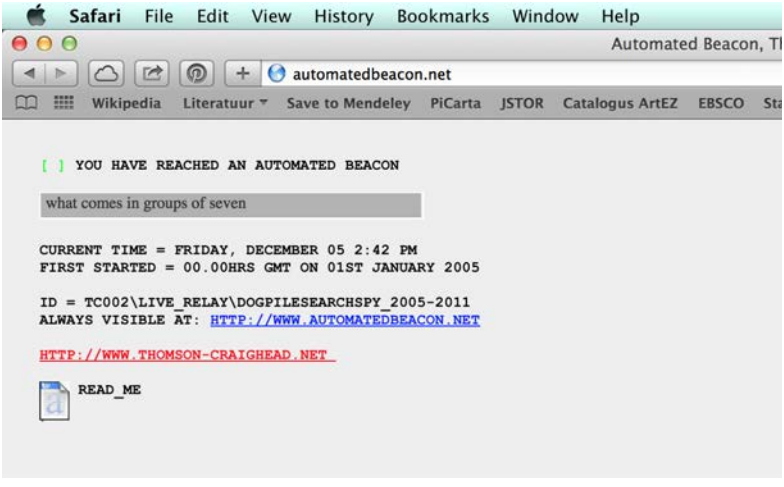

Fig. 1 Thomson & Craighead, *Beacon*, 2005 - present, website, online

information from Dogpile.com—a metasearch engine that combines search results from a variety of search engines like Google and Yahoo![3] —and feeds this information back to the public. In so doing, it acts as a silent witness to our individual online behavior and identity, and by extension (through its

1 The work also exists in the gallery as a data projection and a railway flap sign; http://thomson-craighead.net/docs/beacon.html (accessed October 23, 2014).

2 Kris Cohen, *Never Alone, Except for Now: Mediated Collectivity in Networks* (Ph.D. diss., University of Chicago, 2010), p. 50.

3 Cohen, p. 51, note 4; http://www.dogpile.com/support/Faqs (accessed October 23, 2014).

accumulation) our society. As Rhizome Artbase described it, *Beacon* is "a feedback loop providing a global snapshot of ourselves to ourselves in real time."[4] But the project not only echoes what we—as individuals and as a collective—search for online, it also mirrors the algorithms that are used more and more today by search engines themselves.

Since the end of 2009, the top five sites on the Internet (Yahoo!, Google, Facebook, YouTube and Microsoft Live) and countless others have expanded their page ranking algorithms, which provide the user with the most acknowledged results based on links by other pages, with personalization algorithms, which offer customized results that are best for you in particular, and thus differ from person to person. In order to accomplish this personalized outcome, these Websites use signals ranging from where you are logging in from to what you have searched for before.[5] In his book *The Filter Bubble: What the Internet is Hiding from You* (2011), American Internet activist and online organizer Eli Pariser explains what this shift means for our identity and society. According to Pariser, these engines fundamentally alter the way we encounter ideas and information by creating a unique universe of information for each of us—what he calls "the filter bubble."[6]

The problem with this is twofold. First, it obstructs free and unconstrained personal growth, because, as the author makes clear, personalization can lead to information determinism, in which what you have clicked on before determines what you see next—a Web history you are doomed to repeat. "You can get stuck in a static, ever-narrowing version of yourself," Pariser writes, "an endless you-loop."[7] Second, a democratic society requires a reliance on shared facts and the possibility to see things from another's point of view. Personalization algorithms impede this, because they cause us to gradually become enclosed in our own bubbles. "More and more, your computer is a kind of one-way mirror," the author remarks, "reflecting your own interests."[8]

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4 http://rhizome.org/artbase/artwork/46680 (accessed October 14, 2014).
5 Eli Pariser, *The Filter Bubble: What the Internet is Hiding from You* (New York: Penguin, 2011), pp. 1-2, 8.
6 Ibid., p. 9.
7 Ibid., p. 16.
8 Ibid., pp. 3, 5.

Beacon matches Pariser's observation, with the crucial difference that the artwork confronts us with, and hence makes us aware of, our behavior online and our relation to information on the Web. The artwork, taken together with the notion of the filter bubble, also raises questions like: How do feedback loops that are integrated in online personalization algorithms influence individual identities? What kind of world view will result from interacting with information and other people through such mechanisms? In what ways does it affect our culture? Will it lead to a bland average, or what computer science pioneer and critic Jaron Lanier calls "pattern exhaustion?"[9] How will the relation between the individual and the collective take shape under the influence of algorithmic feedback loops? Does the collective even exist in today's network culture, or have we become no more than a collection of individuals?[10]

This article will address a number of these questions by analyzing the artworks *Close-up, Shadow Box #3* from 2006 by Mexican-Canadian artist Rafael-Lozano Hemmer, *Exploded Views 2.0* from 2012/2013 by Dutch artist Marnix de Nijs, and *Shaking Time Mirror* from 2005 by Israelian artist Daniel Rozin. While Thomson & Craighead's *Beacon* shows viewers the activity of the collective, they themselves cannot interact with the piece.[11] Therefore, the quality of the work lies in revealing collective behavior. In the works by Lozano-Hemmer, De Nijs, and Rozin on the other hand, algorithmic feedback loops affect the behavior of the individual interacting with the piece, they shape the relation between the individual and the collective, and actively construct a collective. By examining the technical, formal, and conceptual characteristics of these works along with

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9 Jaron Lanier, *You Are Not a Gadget* (New York: Alfred A. Knopf, 2010), p. 131; Jaron Lanier, "Digital Maoism: The Hazards of the New Online Collectivism," *Edge*, May 29, 2006; http://www.edge.org/discourse/digital_maoism.html (accessed on October 1, 2014).

10 The term "collective" is problematic because it has different connotations and is used in different ways. In this text, I use it to describe something that is more than just a specific group or subculture, approaching the whole of society. In this sense it is close to the social, with its public and shared nature. When I talk about a specific collection of individuals I will, however, sometimes revert to "the group" which I consider to be a small-scale manifestion of the collective.

11 While people are not invited to interact with the artwork, it is possible, but only very indirectly. If you visit Dogpile.com and enter a search query, this query could end up in *Beacon*. As a viewer of the work, however, you will probably be too late to actually see your own search query.

their socio-political implications and applying theories of Internet critic Eli Pariser, media theorists Jay David Bolter and Diane Gromala, and artists and scholars Anna Munster and David Rokeby, I will answer the following question: How do works of contemporary art reflect on the ways in which algorithmic feedback loops in today's online culture shape the relation between individual and collective, and which alternatives do they propose?

With this article I hope to offer insight into the ways in which the relation between the individual and the collective is increasingly affected by our being online,[12] while simultaneously providing artists and designers with tools to critically reflect on current technological developments in order to create alternatives that are perhaps more human and social, and less technologically deterministic. I believe that studying contemporary art can be particularly productive to achieve these goals, because art employs existing technologies in unconventional and inventive ways, allowing different perspectives and new possibilities of interaction to emerge. Moreover, because art mediates between individual and collective experience, it is in this field that the relation between the individual and the collective is continuously and actively being shaped.

II. Seeing Yourself through Others

In passing Lozano-Hemmer's wall-mounted display *Close-up*, numerous tiny videos of different people appear within the gridded reflection of your own silhouette. On closer inspection, you realize that the videos of others projected within your shadow are in fact earlier recordings of people that, like you, were standing in front of the same screen looking at earlier recordings of other people in their shadow standing in front of the same screen, *ad infinitum*. (Fig. 2, 3) It works with the aid of a computerized built-in tracking system that captures the

12 British writer and curator Morgan Quaintance wrote an interesting piece on this subject. Morgan Quaintance, "Being Online," *Art Montly* 363 (2013), pp. 13-16.

Fig. 2-3 Rafael Lozano-Hemmer, Conroy Badger (programming), Pierre Fournier and David Lemieux (production support), Peter Mallet (photographer), *Close-up, Shadow Box 3*, 2006, high resolution interactive display with built-in computerized surveillance system, 104.5 x 80 x 12 cm (installation variable), private collectors, shown in 2010 at Manchester Gallery, United Kingdom

image of the spectator at the same time that he or she is watching playbacks of previous recordings.[13] What this work shows is a convoluted feedback loop between the individual and the collective, which is in some respects similar to, but at the same time very different from the feedback loop that personalization algorithms induce.

Close-up resembles personalization algorithms in the sense that both construct an "image" of you by analyzing data of other people, comparing it to your data and feeding the similarities back to you. Also, the more people interact with the work, the more data it acquires, eventually triggering up to a maximum of 800 videos at the same time. This is akin to the mechanism that large Internet companies use: the more data users hand over to the company, the more refined their experience can become. An example of this mechanism which bears resemblance to *Close-up*, is Facebook's Edge Ranking algorithm, which provides a unique home-page for each Facebook user featuring and created by your own friends.

The work *Exploded Views 2.0* by Dutch artist Marnix de Nijs can also be seen as a comment on the feedback loops in our online culture, by employing similar algorithms of recursion. *Exploded Views 2.0* is an interactive installation that displays a virtual city constructed from fragments of cityscapes from all over the world. These city fragments are built up from 'point clouds'—clusters of countless little dots in the shape of buildings and

13 http://www.lozano-hemmer.com/close-up.php (accessed October 14, 2014).

squares which are generated from online Web 2.0 photo collections like those found on Flickr. (Fig. 4) *Exploded Views 2.0* reconstructs the top 400 most photographed locations in 3D, by analyzing the GPS tags of all the pictures available on photo-sharing community websites—ultimately using around 100,000 Web images.[14] According to De Nijs, his virtual city is a collective representation of the world based on the photographs of those who initially captured the memory. But the resulting representation is far from neutral and disinterested. Instead, as De Nijs makes clear: "The models are highly detailed at locations where people are inclined to take the most pictures, and where they tend to be most click-happy, [while at the same time] less present, or even absent. Hence, the end-product is not an objective representation of the world, but an inter-subjective verification where collective memories resonate."[15] Like online personalization algorithms, the work exhibits a form of autopropaganda that affirms already dominant interests. What others have seen most often and uniformly will be portrayed with the most clarity, literally and figuratively showing the greatest hits of architectural heritage. While Lozano-Hemmer's work reveals how the identity of the individual is (in)formed by others, De Nijs discloses how on the Web one's worldview is the result of collective behavior.

Fig. 4 Marnix de Nijs, *Exploded Views 2.0*, 2012/2013, computer, custom software, laser scanner, projectors, screen, screen 800 x 400cm, interaction space 800 x 600 cm, collection of the artist

In addition, like the algorithms most websites are based on today, the artworks by De Nijs and Lozano-Hemmer are systems that remain dormant until someone activates it by standing in front of its interactive display and

14 Ivana Hilj, "Biography," 2011; http://www.marnixdenijs.nl/biography.htm (accessed November 19, 2014).

15 Marnix de Nijs quoted in vimeo video "Exploded Views 2.0."; http://www.marnixdenijs.nl/exploded-views-2.htm (accessed November 19, 2014).

uploading data (not necessarily in this order). These works—similar to most sites on the Internet—are the ever-changing result of a series of behaviors, a unique dialogue between man and machine, which constantly reshapes its content. In order for this exchange to take place, however, Lozano-Hemmer's *Close-up* extracts information from its spectators by recording their movements and seducing them with images of other spectators.[16] In De Nijs' work, there is a back-and-forth movement between extracting information from the Web and activating this data by the movement of the viewer. Like personalization algorithms, this recursive extraction of information triggered by the spectator gives these works life and feeds their behavior.

It is of interest to note that, similar to most interactive online media, these works place the participant at the center of attention, creating an individualized experience in order to obtain information. This is an important strategy of personalization algorithms as well. As Phoenix Toews and Ben Carson explain in their text "Technomagic and the Individual in Reactive Digital Art": "the tyrannical position of the "I" is often a cleverly constructed chimera to draw attention away from the simple fact that the individual at the center of the "I" is also a product, their perceived desires and interactions a product to be bought and sold in the capitalist data marketplace."[17] While to some extent this centrality of the observer is also present in Lozano-Hemmer's work, the difference is that it does not situate the experience as an expression of individual identity alone, but rather as the expression of collective identity by using personal data to visually construct a collective narrative.

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16 Pau Waelder, "Rafael Lozano-Hemmer: Biometric Abstraction," *VIDA*, May 13, 2014; http://vida.fundaciontelefonica.com/en/2014/05/13/rafael-lozano-hemmer-biometric-abstraction/ (accessed October 14, 2014).

17 Phoenix Toews, Ben Carson, "Technomagic and the Individual in Reactive Digital Art," 2010; http://www.academia.edu/640556/Technomagic_and_the_Individual_in_Reactive_Digital_Art (accessed November 19, 2014).

III. Temporalizing Feedback

Close-up differs significantly from personalization algorithms in that it does not create a filter bubble that mirrors *you*, but instead echoes *others*—visibly so. The three main characteristics of the filter bubble that Pariser describes—you are alone in it, it is invisible, and you do not choose to enter it[18] —are not enacted by the work. Quite the opposite: you are in it with other people (and a lot of them), it clearly assembles and builds your self-image from the images of others, and you choose to enter and exit it by walking in and out of the frame. In this sense, *Close-up* is more transparent and social than the isolated filter bubble that personalization algorithms induce. But it is a strange kind of sociality.

Although New York City gallery bitforms mentioned in a press release that Lozano-Hemmer's installations have been praised for creating platforms for group experience rather than individual interfaces for solitary participation,[19] the interface of *Close-up* offers only an indirect, delayed form of confrontation. It is in fact precisely this delay that hinders the actual feedback which makes up social interaction. As such, the work neither fosters genuine group experience nor is restricted to a completely individual experience. Rather, it functions somewhere inbetween the individual and the group. As Kriss Ravetto-Biagioli, professor of Technocultural Studies at the University of California, observed about Lozano-Hemmer's work: the interface doubles as a social encounter, but there is nothing intrapersonal in this encounter.[20]

While this lack of direct social interaction may seem to be disadvantageous, it in fact is not. By modulating the time domain, the

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18 Pariser, pp. 9-10.

19 http://www.bitforms.com/exhibitions/rafael-lozano-hemmer-2006/press-release (accessed October 14, 2014).

20 Kriss Ravetto-Biagioli, "Shadowed by Images: Rafael Lozano-Hemmer and the Art of Surveillance," *Representations* 111 (2010), p. 138.

feedback loop that is set up between the individual and the group is deferred and hence becomes a site of reflection.[21] Consequently, the work does not elicit docile and uncritical consumption, but instead excites exploration and contemplation about the relation between the individual and the group mediated by technology. As the artist stated about his work, it is precisely designed to reject a Pavlovian pattern of immediate action and reaction. "[T]he installations all have memory," he said in an interview with *Aesthetica*, "and through this memory is a sense of time interfering, that the pieces are noisy, out of control, indeterminate, diversely populated. It is within ambiguity and slowness that poetry may happen, if we are lucky."[22]

In the work *Shaking Time Mirror* (2005) by the New York-based, Israelian artist Daniel Rozin, a similar effect of time interference can be observed—only in this case it takes place on an individual level. *Shaking Time Mirror* is a software installation that generates a live, computer-interpreted reflection of its viewer. When you stand still in front of the work, your reflection gradually ages and turns into a "frozen," black-and-white image. But when you move, your reflection suddenly shakes off the gray stagnant curst and transforms into a vibrant full color image. Only areas of movement are refreshed with current video though, and the viewer's reflection always gradually grays back again.[23] By alternating between a "freezing" and "defrosting," a fading and reviving of the video image, the work disrupts the familiarity of the viewer's reflection. Instead of providing a stable, lifelike mirror image, the work accentuates the passing of time, stagnation, motion, and change.

In their chapter "Transparency and Reflectivity: Digital Art and the

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21 In "Digital Maoism," Jaron Lanier wrote that in order for online collectives to function well, modulating the time domain—one of the regulating mechanisms that have been most successful in the pre-Internet world—can be an important solution. Jaron Lanier, "Digital Maoism: The Hazards of the New Online Collectivism," *Edge*, May 29, 2006; http://www.edge.org/discourse/digital_maoism.html (accessed on October 1, 2014).

22 Rafael Lozano-Hemmer quoted in Cherie Federico, "Digital Art & the Platform for Participation," *Aesthetica* 36 (2010); http://www.aestheticamagazine.com/rafael-lozano-hemmer (accessed October 14, 2014).

23 http://www.smoothware.com/danny/shakingtime.html (accessed November 26, 2014).

Aesthetics of Interface Design" of Paul Fishwick's book *Aesthetic Computing* (2006), media theorists Jay David Bolter and Diane Gromala observe that there is a dominant tendency within interface design to create a transparent window—something that one can look through unimpededly, without interference or distortion. Following their argumentation, Rozin's *Shaking Time Mirror* can be seen as a reflective interface rather than a transparent one for several reasons. First, it literally reflects the viewer on its screen, even though the mirror image eventually becomes distorted. Second, because of this distortion, the work causes the viewer to reflect on the interface itself, on the process by which the self-image is constituted, and on the way digital technology constructs the human subject.[24]

IV. Repetition With a Difference

As the Canadian artist David Rokeby already noted in 1998, any interface (whether designed to be transparent or reflective) inherently constructs a representation of the user. It defines what you can be and do within the system and inevitably reflects this limited representation back to you, modifying your own sense of self within the simulation. Therefore, the interface becomes a distorting mirror, Rokeby writes.[25] It is this distorting mirror that Pariser is also concerned with, and that lies at the heart of his problem with personalization algorithms. As Pariser observes: "[With personalization filters] Your identity shapes your media. There's just one flaw in this logic: Media also shape identity. And as a result, these services may end up creating a good fit between you and your media by changing

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24 Jay David Bolter and Diane Gromala, "Transparency and Reflectivity: Digital Art and the Aesthetics of Interface Design," in *Aesthetic Computing*, ed. Paul Fishwick (Cambridge: MIT Press, 2006), p. 375. Bolter and Gromala discuss Rozin's piece *Wooden Mirror* (1999), but most of their ideas can also be applied to his *Shaking Time Mirror*.

25 Dave Rokeby, "The Construction of Experience: Interface as Content," in *Digital Illusion: Entertaining the Future with Technology*, ed. Clark Dodsworth (New York: AMC Press, 1998), p. 37.

… you."[26] According to the author, what the filter bubble does is strengthen existing ideas, which can lead the user down a narrow path of self-affirmation and even a self-fulfulling identity.

Rozin's *Shaking Time Mirror* both resembles and differs from the way personalization filters construct identity. While the "freezing" of the viewer's reflection evokes notions of affirmation (the less the viewer moves, the more fixed his or her reflection becomes), the system simultaneously appears to stop feeding back current information to a motionless viewer by effacing the color. The viewer's physical standstill thus becomes a metaphorical one. Only when he or she moves, changes position, is the mirror image brought back to life again. Although both Rozin's work and personalization services are systems based on recursion, Rozin's work does not stimulate viewers to repeat themselves. Quite the opposite: it compels its viewers to be in a constant state of flux or becoming, to be different in relation to a former self. Thus, while personalization algorithms construct individual identity based on stability, consistency and affirmation, *Shaking Time Mirror* constructs individual identity based on change, difference, and transformation. As Pariser observed, it is important to include variation in recursive processes, because "If identity loops aren't counteracted through randomness and serendipity, you could end up stuck in the foothills of your identity, far away from the high peaks in the distance."[27]

The metaphor of the landscape that Pariser uses to describe the effect of personalization feedback loops is a strange reversal of the construction and image of De Nijs' *Exploded Views 2.0*. Its virtual city is constructed only of "high peaks"—of the most photographed cities, buildings and squares. However, when we look at the collective outcome of Web 2.0 photo services, the most photographed places are not necessarily the most interesting places to be—especially since, as De Nijs already noted, the people there are less mentally and socially present. Therefore, these places could just as well be

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26 Pariser, p. 112.
27 Ibid., p. 127.

seen as foothills, as local maximums. For each individual the true high peaks might be somewhere else, still waiting to be discovered. As Rokeby observed about interfaces in general: "The interface defines a sort of landscape, creating valleys into which users tend to gather, like rainwater falling on a watershed. Other areas are separated by forbidding mountain ranges, and are much less travelled."[28] Even more disconcerting is the fact that personalization algorithms often unknowingly distort the individual's world view. According to Pariser, personalization algorithms interfere with our ability to properly understand the world, because they alter our sense of the map. As he explains, "they often remove its blank spots, transforming known unkowns into unknown ones."[29]

In De Nijs' installation it is exactly this distortion of the map (by 'stitchting' together fragments of cityscapes from all over the world) that creates the wondrous artificial city that the viewer can navigate through. In contrast to the world that personalization algorithms create, where you are not even remotely aware of what has been obscured from view, *Exploded Views 2.0* emphasizes the deformities that result from a technologically mediated perception. It reveals how the shift from a discovery-oriented Web to a search and retrieval-focused Web disrupts our view of the world. What's more, the search and retrieval-focused Web (wherein personalization algorithms play an increasingly important role) even inverts the general principle of the map. As the British anthropologist and cyberneticist Gregory Bateson observed about the relation between the map and the territory: differences are the things that get onto the map, not uniformity.[30] But today, the online world (as map or representation) is based on the principle of sameness: the more similarities or copies are found, the more dominant the thing becomes, instead of the other way around. Works like *Exploded Views 2.0* on the other hand, which reflect on this mechanism of accumulation,

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28 Rokeby, p. 39.

29 Pariser, p. 106.

30 Gregory Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution and Epistemology* (Chicago: University of Chicago Press, 1972), p. 457.

might instead stimulate people to discover undocumented parts of the world, by putting difference—not sameness—onto the map.

While De Nijs' work focusses on the difference between the world and its online representation, between individual and collective perception, in Lozano-Hemmer's *Close-up* the concept of difference offers insight into the way in which the relation between the individual and the group takes shape. In her book *An Aesthesia of Networks: Conjunctive Experience in Art and Technology* (2013), media artist and scholar Anna Munster proposed the concept of the mosaic as an alternative image for understanding network experience. Instead of seeing the network as a schematic diagram consisting of nodes and links, the mosaic accounts for the patchiness of the network—its imperceptible flux of opening, closing, joining and separating, of things unforming and reforming relationally. What the image of the mosaic conjures is a sense of things roughly abutting one another, rather than smoothly connecting to form a whole.[31] As Munster explains: "Mosaics emerge processually as a bringing-into-relation that traces and delimits the outer edge of one event, conjoining/differentiating it from the inner edge of the next. It is the edge that is the mosaic's force and that drives its patterning, not the pattern or mosaic "bed" determining where the pieces should sit."[32]

In Lozano-Hemmer's *Close-up*, the edge is a fundamental part of the work's guiding principle—visually and metaphorically. First, it is the individual's silhouette that triggers the piece and is translated into a gridded contour. Second, this contour becomes the place where the individual in front of the screen and the collective (as a collection of previous recordings and encounters) "meet": the video recordings of viewers literally "bump into" the reflection of the person currently viewing it. The edge thus comes to act as the interface between individual and collective experience, as both are simultaneously captured in and expressed through the form of the mosaic. What this work shows—in contrast to the filter bubble that online

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31 Anna Munster, *An Aesthesia of Networks: Conjunctive Experience in Art and Technology* (Cambridge: MIT Press, 2013), pp. 5-7, 23.

32 Ibid., p. 32.

algorithmic feedback loops create—is that our individual experience is the result of collective experience, and hence is always already distributed and collective. "[The] recurrence of the object as something cognitively shared by many," Munster writes, "traces the horizontal line of experience as fundamentally collective." But, as she explains, and this can be seen in Lozano-Hemmer's work as well, this is never a straightforward exhange. Rather, "the shared mosaic of collective experience wanders and loops, creating something more nomadic and tangled."[33]

What seperates *Close-up* from the algorithms that populate our online environment is that the edge that connects experiences has itself become an experienced relation. It shows us the relationality of experience—a passage of things edging with, against, between, and away from each other.[34] Moreover, Lozano-Hemmer's work reveals that, even though individuals may behave differently, they also respond to "group" behavior—mirroring and diverging from the collective. *Close-up* displays patterns of behavior, creating rhythms of repetition, but also of difference. Consequently, the individual videos speak together, but not as one. In the words of Munster, it is like a vibrating chorus in which neither unity nor disparity prevails. "As if we were listening, not to the same experience, but instead from the inside of (a) collective multiplicity."[35]

V. Conclusion: On the Other Side of the One-Way Glass

The works by Thomson & Craighead, Rafael Lozano-Hemmer, Marnix de Nijs, and Daniel Rozin differ from online personalization algorithms in several important ways. First, instead of concealing its mechanism, all four works reveal how the networked field operates: they openly feed individual

33 Ibid., p. 40.
34 Ibid., p. 35.
35 Ibid., p. 36.

or collective behavior back to the viewer or user, thereby exposing what remains hidden in most sites on the Internet today. While the feedback loops generated by personalization algorithms are usually invisible, these works demonstrate how things continuously form and unform relationally, based on individual or collective behavior. They are reflective rather than transparent interfaces that show how media and technology shape our sense of self, our view of the world, and our relation to others. They are honest mirrors that visually construct a representation of its viewer(s) and show the distortion that inevitably takes place during the process. Therefore, these works—as interfaces—become sites of reflection that excite exploration, critical examination, and contemplation about individual and collective identity shaped by feedback loops and recursive processes.

Second, the works by Lozano-Hemmer, De Nijs, and Rozin actively shape the nature and possibility of individual and collective behavior (as any interface inherently does). Contrary to personalization algorithms however, these works do not induce affirmation, uniformity, and sameness. Instead, they trigger change, difference, and transformation. By modulating the time domain and delaying the otherwise immediate interaction between viewers in Lozano-Hemmer's *Close-up*, the viewer is made aware of his or her own behavior, allowing more conscious and deliberate responds in relation to other viewers. De Nijs' *Exploded Views 2.0* allows its viewer to discover the artificial city that is the result of collective behavior, while simultaneously encouraging exploration of yet undocumented parts of the world. In Rozin's *Shaking Time Mirror* the stagnation of the viewer's reflection compels him or her to be in a constant state of flux or becoming, to be different in relation to a former self.

Third, both De Nijs and Lozano-Hemmer demonstrate with their work how the self is always constructed in relation to others. While large Internet companies try to make the formation of identity easier by taking it away from the individual and handing it to personalization algorithms—thereby locking people inside their own reflection—these works create a public domain where viewers are able to actively express themselves in relation

to and through others. Consequently, these works (along with Thomson & Craighead's *Beacon*) add a social dimension by visually assembling and displaying the collective as collective, rather than only feeding that which is relevant to the individual back to the individual. In addition, they do justice to the multiplicity that is the collective: the collective outcome of a recursive algorithm is never smooth, homogeneous and easily consumable, but instead filled with difference and repetition. Moreover, in these works the identity and behavior of the collective is in continuous flux, thereby showing that the collective is always just an aggregate, a whole loosely formed but also able to unform—turning every connection into an experienceable relation and site of reflection.

Keywords

Personalization Algorithms(개인전용화 알고리듬), Feedback Loops(피드백 루프), Online Culture(온라인 문화), Individual and Collective(개인과 집단), Contemporary Art(현대예술)

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Abstract

From Me to All of Us, and Back Again: Algorithmic Feedback Loops in Contemporary Art

Marijke Goeting
(Radboud University Nijmegen, ArtEZ Institute of the Arts)

The way we gather information, interact with each other, and develop our identities is shaped more and more by personalization algorithms that are used by many sites on the Internet today. The problem with these personalization algorithms is that they provide the most relevant information for each person individually, by feeding your own interests back to you. The feedback loop that this creates not only greatly influences individual identity, but also affects the relation between the individual and the collective. This article examines artworks by Thomson & Craighead, Rafael Lozano-Hemmer, Marnix de Nijs, and Daniel Rozin and analyzes the effects of algorithmic feedback loops on individual and collective behavior, on one's self-image and world view, and on collective identity. Ultimately, I explore the alternatives that can be developed by reshaping the mechanism and characteristics of recursive processes.

나로부터 우리 모두에게, 그리고 또다시 나에게로: 현대 예술에 있어서의 알고리듬적 피드백 루프

마라이카 괴팅 (래드부드 대학 나이메이건)

우리가 정보를 수집하고, 서로 상호작용하고, 우리의 정체성을 만들어 가는 방식은 점점 현재 인터넷상의 많은 사이트에서 사용되는 개인전용화 알고리듬에 의해 형성되고 있다. 개인전용화 알고리듬은 우리 자신의 관심사를 우리에게 공급해 줌으로서 각각의 개인에게 가장 연관되는 정보를 제공해 준다는 것이 개인전용화 알고리듬이 가진 문제이다. 이것이 만드는 피드백 루프는 개인의 정체성에 중요한 영향을 미칠 뿐 아니라, 개인과 집단 간의 관계에도 영향을 준다. 본 논문은 톰슨 앤 크레이그헤드(Thomson & Craighead), 라파엘 로자노-헤머(Rafael Lozano-Hemmer), 마닉스 드 나이스(Marnix de Nijs), 다니엘 로진(Daniel Rozin) 의 예술작품을 살펴보고 알고리듬 피드백 루프가 개인적, 집단적 행동, 자아에 대한 이미지와 세계관, 그리고 집단 정체성에 미치는 영향을 분석한다. 궁극적으로 본 논문은 순환적인 과정의 구조와 특성을 재구성함으로써 개발될 수 대안들을 모색하고자 한다.