

CONCRETE ANIMATION

(abstract)

This essay was originally delivered as an illustrated lecture at the 2007 Pervasive Animation Symposium at the Tate Modern. My original goal was to describe a category of animation practice emerging today and to compare its various tendencies with my own experience making films, books, and installations. I have attempted to balance my personal art history within an analysis of larger issues in animation. "Concrete animation" refers to work that focuses primarily on materiality and process. It has a precedence in contemporary art practice; it has one foot in the distant, pre-cinema past; and one foot on a path leading to a future of digital and manual animation.

(key words, in no particular order)

animation, concrete, material, process, self-referential, traditional animation, cel animation, film installation, flipbook, sculpture, kinetic art, mutoscope, object animation

The Oxford English Dictionary's first definition of "draw" is "to cause (anything) to move toward oneself by the application of force; to pull," and continues for 57 more definitions each dealing with moving, extracting, hauling, distorting, constructing, breathing, assembling, stretching, on and on, before arriving at "to trace (a line or figure) by drawing a pencil, pen, or the like, across a surface; to cut (a furrow) by drawing a ploughshare through the soil."¹

I began drawing as a child and, with encouragement from my architect father and school mates, just never stopped. But by my early 20s I became impatient when someone lingered too long on one drawing or overlooked another. The solution was to control the staging and tempo of presentation, to add motion, to "put on a show." Now 40 years later, I'm still learning how much animation is like drawing, in those original muscular connotations, not just making marks on paper but, more profoundly, as an active process of organization and movement through time. And I'm still in awe of animation's mysterious paradox of vision, that what you see (a sequence of static images) is NOT what you get (movement). Nowhere is this paradox more apparent than in "concrete animation(Fig 1)," a term I hope to reinvent or at least reclaim from prior usage.



Figure 1

“Concrete” was a term used by William Moritz² and others as a synonym for abstract or absolute animation, perhaps in reference to the planar abstractions of *de Stijl*: Doesburg and Mondrian. “Concrete” also applied to poets like Emmett Williams who arranged words and type into rebuses and patterns, and to musicians like Pierre Boulez who used tape recording and radio to create collaged compositions of “real world” sounds. In each case there was a defiantly radical commitment to eliminate the conventional accretions of ornament and narrative. After every war there seem to be cries of “back to basics.” From Bauhaus to Black Mountain came efforts to re-glue essential elements into new forms appropriate to a new age. Our generation hasn’t had a great war, but the pressures from the roiling upheavals in technology, communication, and market globalization have certainly affected the arts, including animation.

I propose to link “concrete” to actual materials, objects not just images, and the processes which cause them to spring to life. It would not then be tied to any particular rules of design or vanguard art theory. It would suggest the tactile, the tangible, the real, the stuff which is often forgotten in the river of illusion. Just as concrete, used in building construction, is formed by the coalescence of discreet particles into a solid mass, so too is animation more than the sum of its parts, be they frames on a strip of film, pages in a book, or a sequence of objects.

There is a particularity associated with concrete things as opposed to general, abstract, or idealized things. A brush stroke, a paper texture, smeared pencil mark—all are evidence of human intelligence and labor. And while certain 20th C. art movements railed against these idiosyncrasies to glorify an impersonal art of or for “the people” or to critique the concept of the genius-made masterpiece, the art world seems to have recovered. Animation production, so dependent on technological development, hasn’t been so flexible. Thus when it became possible to produce a Disneyesque entertainment of impossibly perfect puppets there was no need to have a political or esthetic debate; it was considered ineluctable. And even now that this mode of idealized animation is being tempered by algorithms for abraded textures and random furriness, and captured, rather than invented, motion, it still seems pertinent to ask what has been lost. And to understand the attraction of real stuff.

The stormy marriage of animation and cinema seems to be either on the rocks, or destined to being redefined well beyond recognition. A live action feature that doesn’t depend on frame by frame technology might now be considered “traditional” cinema. Both the end of animation history³ and the end of film cinema as we know it seem to be drawing nigh; the computer makes animation production both more complex and childishly, fiendishly easy; while plasma screens flatten the earth into an audience of consumers, pedestrians, or believers. When anyone can become an “animator” by simply defining two key frames, it’s clear that animation will more likely be made by artists who do not regard themselves as “animators” but simply as artists currently “working with animation” to achieve other goals in esthetics, business, publicity.

Concrete animation is a response to the myth of technological destiny, the proposal that feature-length and gaming CGI entertainments is the logical evolution of our chosen art, just as surely as cels replaced paper. It argues that the evolutionary forces of the market, labor costs, technological advance and the like do not impact and determine the totality of

animation practice. Concrete animation offers a retrospection, a kind of cathartic wrestling match with the 19th Century, whose pre-cinema toys and gadgets have always inspired animators, and with practices like painting, quick sketch scribbling, stop motion cinematography. There is a thirst for something real, tangible, palpable, funky, especially by young students who have already mastered the streamlined Flash look, well before taking Animation 101.

“TRADITIONAL ANIMATION?”

Here is a preliminary list of what I don’t mean by concrete animation:

1. Traditional animation, an offensive epithet designed to marginalize any animator who doesn’t work in 3D CGI. It defies definition yet limits and downsizes the art, even if some artists accept it as a badge of honor.
2. 2D animation, a risible over-simplification, implying an absence of one or more dimensions, as if the issue were an appalling oversight rather than a stimulating subject of investigation by artists since the Renaissance.
3. Hand-drawn animation, a trusted method of preserving the subtleties of an artists’ idiosyncratic markings. But this is only one of many possible techniques used in concrete animation which refuses to be defined by a technique.⁴
4. Cel animation, which organizes the fruits of #3 into systematic sequencing and layering even if the eponymous celluloid isn’t in use.⁵

Nor do I mean the opposite of “Paperless animation,” in which an artist draws, paints, composites, and edits on a computer with a digital tablet. It may preserve a simulacrum of manual drawing and messing with textures and lighting, but the working experience rarely rises above that of virtual reality. It subverts the specialized assembly line by concentrating all functions within the computer, with either an omnibus application or an array of complementary applications, and uses a common language to transmit data. It’s even “environmentally friendly.” This is the way I and many other animators now work. This supposed good thing comes with a list of heavy costs: Repetitive stress, eye strain and other physical health problems; the inability to freely experiment with the computer due to its systematic logics, its cleanliness, its lack of noise, its lack of messy provocative materiality, its refusal to subvert protocols.

Concrete animation is not a rigorous category in a general theory; I am not a “Concretist” out to promote “Concretism.” Bright lines drawn in the sand tend to dissolve in the tide. I think of it as a cleansing flavor to clear the visual palate, as a tendency to remain deceptively honest to the nature of the medium, to let a drawing look like a drawing, not a sparkling confection. It can provide a context for certain kinds of projections that seem both sculptural and graphic, like Anthony McCall’s “solid light” film installations from the 70s (now being reinvented through digital animation and projection) where viewers could experience the conical beam of the projector light instead of, or in addition to, the linear image flickering on the screen.

Concrete animation is experiential and pervasive; it may take many forms and exist in a wide range of sites. Taking into account a broad historical view of animation, concrete animation is to be found in the following forms:

1. Self-referential animation, films whose subject is dominated by material and process. These formal considerations don’t necessarily affect a work’s content. But

when Virgil Widrich (“Fast Film,” 2003) animated color photocopies of classic Hollywood films by treating each frame as a material object (cutting, tearing, crushing, folding with loony abandon) it did seem like an older medium (printed paper) was indeed subverting and re-asserting dominion over the cinematographic conventions of the Hollywood narrative.

2. Animation installed in a non-theatrical venue: in a gallery or other public, non-sedentary or unexpected space; projected onto or within sculptural objects, during live performance, onto irregular, exterior facades, from moving vehicles, into a single-viewer peepshow, etc.⁶
3. Object animation which displays physical moving objects arrested in synthetic time by strobe light or shuttering devices (both low and high tech). This could be considered the intermittent equivalent of the pinhole camera.
4. Flipbooks and other handheld devices for rapid image display.

ARTS AND CRAFTS ANIMATION?

Techno-devolution will effect the animation market. Animators who have sold, rented, or licensed their films for pathetic sums can branch out from ephemeral media (TV, the Web) to mediums that are more, well, concrete, unique or in limited editions. It hasn't hurt Kentridge, and other artists who show their drawings, flipbooks, sculptures AND films in galleries. Even the ubiquitous DVD will leap off the gallery or retail shelf, especially housed in a hand-crafted wooden box adorned with an original painting, “suitable for framing.” If this causes one to wince now it may be useful to remember how the consequences of 19th C. industrialization led Marx to analyze labor, materials, art, and products. Pre-industrial animators (let's imagine solitary flipbook artists) produced hand-crafted art objects which they then sold in the market and, after deducting for paper and ink expenses, made enough for their families to live. With the advent of the industrialized cartoon studio they worked at one of many specialized tasks and took home a paycheck. They became “alienated” from the product which had been transformed from art object to an entertainment commodity, a mediated event leased to the paying public on a temporary basis. And even if cels and backgrounds have now emerged as collectable objects they are stamped with the studio's logo, not the individual artist's signature. They have become yet another branded product, sold in an “animation gallery” along with other popular commodities.

When I began to make films I felt liberated from the burden of the art history and the art market, which reeked of business, hype, snooty gallery functionaries, and the sycophantic swamp of criticism and patronage. Film was democratic and still retained a radical political aura from the early days of Soviet cinema up to the authenticity of underground movies. But I was confusing production with distribution, which still required that artists submit to the Hollywood commodity model. My films, no matter how amateurish, hand-crafted, or personal, were still categorized as non-sponsored “short subjects” and sold in the non-theatrical market alongside educational and self-improvement films. And the communards at the film co-ops didn't offer a significant advantage beyond rhetoric.

My introduction to animation came in 1968 when I landed a job as an apprentice in a commercial cartoon studio where I learned all the specialized functions, short of shooting and animating. Those I took up after hours at home where I built a small camera stand. I had already shot hand-held experiments in the manner of Brakhage. I also greatly admired

“Yellow Submarine,” but didn’t know how to synthesize these sources. My experience in the trenches drawing inbetweens imprinted my consciousness as an artisan, deeply involved with tools and craft. But alone with my flipbooks and Bolex I felt the distinct lure toward wanton recklessness.

By 1972 I had become familiar with Godard’s reflections on “truth @ 24 fps,” the “de-materialization of the art-object”, not to mention process, minimalism, materialism: slabs of lead, houses sawed in half. Then I saw George Dunning’s brilliant “Damon The Mower,” which showed small sheets of unattended drawings twitching on a wooden tabletop. Dunning resisted the easy path of illustrating Marvell by separating the poet’s words from the pictures: a delightful trick that mirrored the camera’s self-conscious point of view. The “big idea” I took away was the “conceit of authorship,” a subterranean tendency toward self-reference found in all the pioneering animators, from Blackton and Cohl, to McCay and the Fleischers.

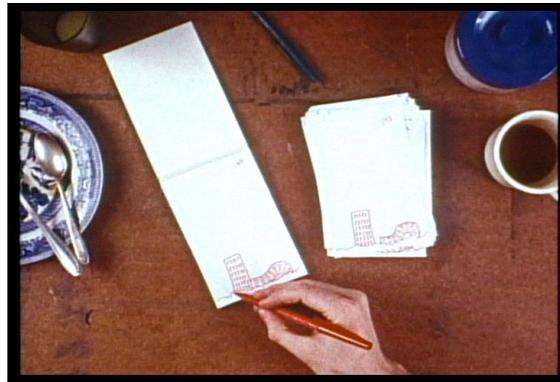


Figure 2

My own re-working of the expanded point of view was called “Trikfilm 3 (Fig. 2).” Here pixilated hands appear to draw a flipbook on a memo pad even as the images animate, a blatant impossibility, perhaps. Dunning had correctly guessed that the viewer could process a stack of casually aligned drawings. I added an Inkwell hand-in-the-frame as an anchor, though without a character gaining liberation from its author. In fact it’s all about the “process” and has very little in the way of humorous phases, unless you count the humping skyscrapers.

I would be occupied with this form of “self-reflexive” animation for the rest of the 70s. This being the age of manifestos I called the films “anti-cartoons.” The contrarian “anti-” to promote my counter-culture world-view; and the pejorative “cartoon,” to signify a simplistic, shallow, immature art. I hoped the terms would cancel each other to rescue the “C Word” from the grips of Disney’s infantilism and restore its connection to drawing as such. More Saul Steinberg, less Norman Rockwell. My next films “Step Print” and “Block Print,” 1976 and 1977 respectively, the most radical (and least popular) examples, were designed for non-theatrical presentation. Neither had a sound track, overt narrative thread (other than a descriptive chronicle of the film’s production), or any consciously expressed notion of drama. They were both flat procedurals, bordering on the grammar of a documentary instructional program. And in retrospect I would call them more concrete animation than anti-cartoon.



Figure 3



Figure 4

BLOCK PRINT AS BOOK

Block Print devotes 17 minutes to the production of a mutoscopic device whose whirling pages reconstitute a walk around an actual New York City block, still in the throes of gritty urban blight. The subject was first shot in real time, then duplicated, repositioned, and sped up on an optical printer, then duplicated on a microfilm printer, then cut up frame by frame and assembled into a round book (Fig.3), then finally animated page by page against the original sidewalk and buildings (Fig.4). The subject transformed from cityscape to a transformation of linear space into sequential phases of time.

I was hoping in this flurry of mechanical reproduction to discover some essential distinctions between cinema as document and animation as synthetic construction. Both the beginning and the ending have fixed durations determined by the physical space traveled, while the middle chapters briefly illustrate the gloomy tedium of industrial work

space. The labor of the worker at the microfilm service lab (loading the roll of film and adjusting the settings of the electrostatic printer) is complemented by the repetitive tasks of cutting and animating on film performed by the animator/artisan.

The transformation through expansion and reduction of film frames to paper pages allowed the space on the city block to be bound into the form of a round book, a cycle without end. Turning the cine frame into a paper print opened up traditional tools of manipulation: cutting, notching, folding, all quite tactile manipulations which I explored more fully in “Head” (Fig. 5, 1975) and “Lineage” (1979). And the 4 “Block Print” books, assembled from the mutoscope reel, now serve as tangible evidence of the original walk.



Figure 5

STEP PRINT AS INSTALLATION

With few exceptions (McCall, Paul Sharits) film was not accepted in galleries in the 70s because the film projector, unlike video, was a complex, noisy contraption that needed constant attention. Motion pictures were also considered a vulgar spectacle (“If it moves, it’s not for us” sniffed the NY Times critic John Canaday about Robert Breer’s films). But the main reason might have been purely market-based: what was for sale? who would want to buy a reel of film that had to be threaded and projected, and would only become brittle and fade? And besides, it would be a copy, not a unique, signed object.

Non-profit venues like Artists Space, The Kitchen, and Franklin Furnace sprang up as an alternative. Unlike the proscenium theatre, a gallery space encourages an inquisitive mood. You are on the prowl, actively browsing, grazing, a noble hunter-gatherer, not a optical serf, suffering the whimsy of a tyrannical filmmaker.

“Step Print” was installed in two parts, a film loop projector activated by the viewer with a foot switch (Fig.5) and a composite “quilt” of sequence images rear-lit, as in the film, to emphasize their luminance. One could either stop and play the film for any length, or move into the secondary space to examine the drawings. Fairly random accessible for the 70s.

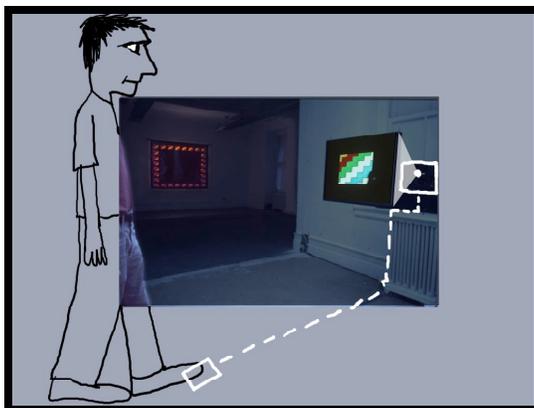


Figure 6

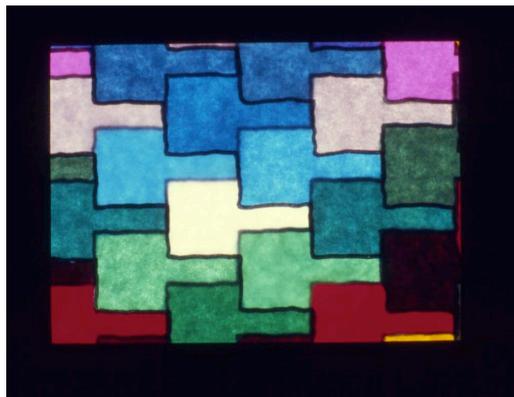


Figure 7

DRAWING/FILM/COLLATION

“Step Print” is divided into 3 chromatic chapters, each containing a 28 drawing cycle. The design is a simple step pattern found in abstract weavings throughout the world. The colors were applied with markers which bled through to the opposite side of the paper, resulting in a double-sided, mirror-imaged object.

“Step Print” follows rules, e.g. shooting the drawings at one unalterable tempo. But by treating the drawings as individual objects as well as phases in sequence I was able to discover interesting varieties of permutation. The strategies were very simple, as demonstrated: reversing orientation and reversing sequence direction as single and as doubled layers.

The experience of animation shooting was illustrated by intercut documentary shots, both live action and frame by frame, just as contrived as McCay and Fleischer. Traditionally, shooting was the most demanding, least creative stage of production. With “Step Print” the shooting was numbingly methodical, but the random pixilation of real hands does at times provide a counterpoint to the systematic flow of patterns.

Oskar Fischinger was the primary precedent for “Step Print.” During his influential career Fischinger gave us glorious color abstractions tightly synchronized to music as well as silent visual equivalents to music, and even experiments in concretely visual sound by drawing optical waveforms. I could have organized my experiments with the serial music of Glass or Reich, but I felt the need to keep these experiments provisional, more like chapters in a logbook. I wanted viewers to feel they were simply observing a guy at work in his studio, no more, and to realize that it’s often quite boring and absurd, but that sometimes you hit an unexpected stroke, like a chord from Duke Ellington, and out pops dancing linoleum! (Fig. 6) But the jazz is in your mind. Just as Fischinger thought his later work should be experienced independent from music as to avoid becoming merely illustrative, I felt that a gallery should be a neutral contemplative space, a kind of sanctuary from aural intrusion and interpretation.

ANIMATION AS SCULPTURE

By devolving from media, a universal mobile unit of communication, concrete animation is often to be found only at specific sites, rooted to a particular location, demanding a certain investment from the viewer. One example found only in the controlled environment of a gallery, is the kinetic sculpture of Gregory Barsamian. It is essentially a large motor-driven zoetrope with looped cycles of transforming objects instead of images, lit by a perfectly tuned strobe which creates a shuttering effect to freeze the rotation movement and animate real sculptural objects. The vision created in the blinking darkness has a hair-raising, dangerous, preternatural quality, an effect similar to Lumière’s train in its time. It not only appears to be real it *is* real, occupying real space, usually viewed in the round. Barsamian’s work must be roped off to prevent destruction of the device and injury to viewers who might be tempted to reach out and touch it.

It was ironic that the most discussed piece in the 2006 Pixar exhibition at MoMA was an un-credited, unacknowledged appropriation of Barsamian’s work featuring Buzz Lightyear and others. Having been spoiled by the virtuosity of ever faster, more highly resolved and exquisitely choreographed fantasies by cutting-edge digital production, we stand mesmerized by whirling objects in real space transformed to a performance in synthetic time. The perverse devolution of puppetry from the hyperrealism of CGI to its root in stylized abstraction scores a delightful shock.

The zoetrope is also the essential engine of concrete animation in Eric Dyer’s 2006 film “Copenhagen Cycles“ which is based on footage shot on a bicycle which was then printed, collaged, and engineered into 25 revolving sculptures re-filmed with a fast shutter DV camera. Again, the traditional definition of animation is stood on its ear to produce a synthetic time-based work of great beauty. (This work will be shown as a four screen installation with live feeds from the zoetropes at the 2007 Platform Festival in Portland, Oregon.)

Perhaps the most venerable and most site specific contemporary zoetrope is “Masstransiscope,” Bill Brand’s 1980 installation in an abandoned Brooklyn subway station: 228 panels of brightly lit, painted abstractions, 300 feet long, come to life as commuters gaze from the windows of the express train.⁷ The streaking vision is intermittently subdivided into discreet intervals by a black dividing wall with vertical 1/2” slits placed every 15”. Though now it is covered with graffiti, we can hope that future projects could perhaps be based on graffiti itself. The most recent application of the linear zoetrope is in the hands of Joshua Spodek who approaches the process from a highly technical

perspective using slit-scans of commercial photography; the result appears to be heading toward advertising.

The concrete aspect of these works, so rooted in the tradition of Reynaud, Marey, and Muybridge, goes beyond merely revealing material and process. By building complex environments and contraptions which are unwieldy, clanky, and anything but portable, designed to investigate the essential mechanisms of perception in motion, these artists are becoming the architects of animation. Just as pilgrims in an earlier age flocked to cathedrals to actively witness a unique experience we can expect to visit spaces of controlled intermittent observation, where image and sculpture spring to life as we physically move from position A to position B, through, along side, over and under animating demimondes of synthetic time.

FLIPBOOK AS SCULPTURE

Predating the advent of mechanical gears and shutters is the intimate, voyeuristic flipbook, which relies on a modicum of manual skill to control the flow of data. Yet even if thumb-pressure cannot reproduce a smooth playback the staccato rhythms offer an optical, and haptic delight. The viewer becomes the engine of re-creation, inventing moments that may never have existed.

Flipbooks can be unique experiments in form with a diversity of page shapes and binding technologies; they can reveal sequence imagery and text on one or both sides. Even though they carry a populist legacy they have migrated into the precious Artist Book category, especially if signed in a limited edition. Robert Breer claims, with an ironic twinkle, that his “Image Par Images” published by Galerie Denise René in 1955 for its seminal kinetic art show, “Le Mouvement,” was the first fine arts flipbook. And who am I to doubt him?

What began as regression in the service of my inner-drawing-child grew into an obsession with collecting, experimenting, publishing. There always seemed to be a flipbook or some kind of printed matter relating to each of my films.

The excellent Daumenkino exhibition organized in 2005 at Dusseldorf’s Kunsthalle by Christoph Schultz displayed a wide range of books from anonymous advertisements to Gilbert and George.⁸ Improving on the conventional museum vitrine presentation, visitors could even play many of the rare 19th century books on MP4 players. Among the contemporary installations was the work of a young Berliner, Volker Gerling: photographic portrait flipbooks.

The books are carried by the artist, arranged on a peddler’s tray (Fig. 7), on inter-city back-packing journeys, e.g. from Berlin to Munich. (hmmm, hints of young Fischinger.) These *Wanderschaften* lend a romantic even spiritual component which is heightened by the artist’s self-imposed assumption of poverty: he trades the viewing of his flipbooks for food, shelter, or small amounts of money. And as the viewer holds and recreates the decisive moments when the pages were recorded, Gerling relates the specific circumstances of that moment. In each case the sequence is unrehearsed and fulfills the directions of the subject. In one, a young woman with bountiful hair looks quite vulnerable and depressed as she gazes into a mirror; the pages go black as she closes her eyes; her eyes open onto her new crew cut which she regards with evident delight. As an animator I found this sequence

almost perverse in denying our surveillance of the dramatic transformation. But, as Gerling tells us, she didn't want to see her haircut in action, so why should we? By suggesting a multiplicity of narratives rather than demonstrating one obvious route, this deceptively honest and simple flipbook approaches the poetry of August Sander. In addition, Gerling makes performances by flipping his pages in front of a camera fed to a digital projector, while recounting his tales of wandering and recording, with live music mixed into the background.

My latest film is a 10 minute cartoon dealing with language, politics, anger, self-deception, betrayal—garden variety angst— is less concerned with formal process, yet it too has a concrete component: a flipbook, entitled MoveOn. It contains drawing, photography, and kinetic text, color xerox on both sides of synthetic, waterproof, supposedly indestructible paper. It is bound by one centered post so there is no spine and pages extend in both directions, thus offering 4 sequences to view. This binding post (the technical term is sex bolt) can be loosened to rotate each page to alter the sequence order, melding the content into a wide range of flickering possibilities. It is the first flipbook I have made in a limited edition, to be seen in a gallery, attached to the wall by a flexible gooseneck (Fig.8)

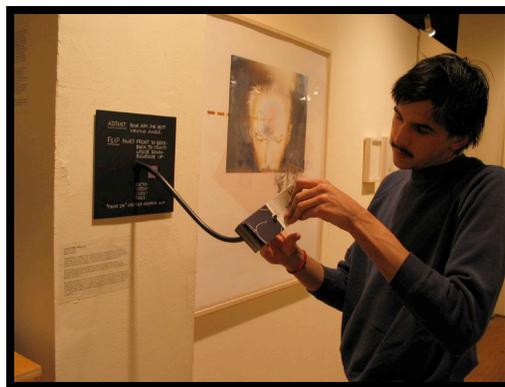


Figure 8

Again, I credit Breer as a precedent for randomness, particularly in his insouciant shuffling of sequence cards and stuttering mutoscopes. He in turn acknowledges Hans Arp who famously claimed that he happened on tactics of chance by accidentally dropping cutouts on his studio floor in Zurich, perhaps near the Café Voltaire, that well of Dada trickery. While creative disorder has been re-worked countless times it does seem most delicious when applied to the mechanical re-enactments of cinema.



Figure 9

I hoped the content, images of naked human bottoms rhythmically swaying, would offer some erotic delight, and be a popular success. Alas, having used myself and my wife as cheap but willing models (these were the bottoms on hand) I'm afraid my dreams of riches must be postponed. But to seriously investigate the potential for the erotic flipbook one would surely consider, as with any book, the private, ruminative nature of reading. The solitary reader isn't disturbed by the reactions of a collective audience, perhaps snickering as a nervous reaction, or defensive laughter. The reader can play the book over and over, reversing or slowing down, stopping, or accelerating the action on demand.⁹

Jan Svankmajer, the master of animated transformation, places into dreamy turmoil objects we thought we knew well, concrete material we use in everyday, waking life, like food, toys, tools. In "Dimensions of Dialogue," for example, two heads, composed initially in the manner of Arcimboldo out of vegetables, communicate with each other through acts of voracious cannibalism, each successive course reducing the material to ever finer particles in an apt metaphor for linguistic aggression. Svankmajer has expanded this dark, Czech-inflected surrealism into the gallery setting where small sculptural objects are hidden from view in a black sack: one must muster courage to reach in and fondle these pieces of varying weight, texture, and surface quality. The effect takes on a visceral intensity, locking the fondler into a conspiracy of the imagination.

Combining the private flipbook experience and Svankmajer's pouch, our mobile, media-drenched culture is now inundated with pocket-sized portable devices for communication and private media consumption. The impact of these devices on concrete animation is difficult to assess, particularly as they are currently positioned primarily as marketing platforms. But I feel this delivery vehicle embodying the direct manipulation of objects which are both tools and art will alter how future animators think about their practice.

After 40 years of controlling the flow of pictures in time and space, I have come to understand that the concrete stuff I use to put on a show, whether it's embedded in the film's architecture, or grasped in greedy, flipping, manipulating fingers---this stuff can also act as an emergency exit to return some measure of freedom and control back to the viewer.¹⁰

¹ The Compact Edition of the Oxford English Dictionary. Oxford University Press, New York, 1971.

² William Moritz, "Beyond 'Abstract Criticism'" Film Quarterly V. 31 N.3 Spring 1978.

³ Mark Langer, "The End of Animation History" 2002, <http://www.asifa.net>.

⁴ Just as experimental animation, if such a genre exists, cannot be defined by techniques or esthetics.

⁵ The use of acetate cel layering for frame by frame compositing photographically onto motion picture film has virtually disappeared in professional production studios.

⁶ Among the many artists who have turned to gallery installations in the last decade two offer a vivid contrast in self-referential process. William Kentridge made his reputation by using direct manipulation of charcoal drawings, a technique so primitive it calls to mind the lightning sketch artists like H. Stuart Blackton. Referencing a later era of animation development is Brent Green who sabotages the protocols of layered cel animation by treating acetate and glass sheets as if they were candy wrappers, wrinkled, with edges and flares, then shooting them with a hyperkinetic camera, often including his rural Pennsylvania barn and trees in the background. In both cases the funky smudges, pentimenti, and environmental noise left by the artist's hand are incorporated (concretely) into the total design experience.

⁷ <http://www.bboptics.com/masstransiscope.html>

⁸ Daumenkino: The Flip Book Show. Kunsthalle Düsseldorf, Snoeck Verlagsgesellschaft mbh, Köln, 2005.

⁹ <http://www.geogrif.com/moveoncomp.html>

¹⁰ As I write I am currently developing a handwheel which will allow a viewer to activate and control an animated film displayed on a small digital wall screen, much like a mutoscope. This hand-cranked device will go forward or reverse at any speed to mimic the responsive behaviors of a flipbook.