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GRAPHICAL FILM: THE VECTOR

Taking a Line for a Walk

> In all these examples the principle and active line develops freely. It goes out for a walk, so to speak, aimlessly for the sake of the walk.
>
> —*Paul Klee*[1]

Undecidability

The poetry of sheer movement in the *Sortie*, still potent after all these years, could not maintain itself. Cinema had to move from the sensation of the event to the perception of objects, from nonidentical immersion to the proliferating unities of navigable space-time. The cut brought the principle of representation: of delineating commotion as discrete objects in space-time. To that extent, and to the extent that it implies a subjection of the perceiver, the cut is always lacking, always inadequate to the plenum it depicts. Its unity not only implies multiplicity; it exists in a dialectical relation to the flux of pixels without which it has nothing to organize, but which to it is always only nothing. Out of that dialectical construction of object and subject a third principle arises: communication. Immersion in the pixel's commotion corresponds to Peirce's firstness, the Lacanian Real; the cut to Peirce's secondness, the Lacanian Imaginary. The early history of animation gives us a privileged glance at the transition to Peirce's thirdness, the Lacanian Symbolic, to concept and meaning, socialization, the paradigmatic axis of film. In deference to its digital destiny, I will refer to it as the *vector*.

A vector is any quantity that has magnitude and direction. Computer imaging uses vectors to define shapes by describing their geometry rather than allocating an address and color value to every pixel. For example, instead of specifying every point on the surface of a sphere, it is far more economical to instruct the computer to draw a circle and rotate it about its diameter. In graphical terms, then, a vector is a line moving through time and space. In the zero of raw movement that first amazed the patrons of the cinematograph there is at base only the invisible motivation of the black frameline. In a strict sense, the unities produced by framing, compositing, and editing make the cinema visible, lifting it from the undifferentiated immanence of the nonidentical to the "being" of the object. The vector takes us one step further: from being to becoming, from the inertial division of subject, object, and world to the mobile relationships between them.

In *La Sortie*, the motion inherent in the instability of the frameline acts as a given, as something that, since it sums all movement as equilibrium, is perpetually now. Cutting literally puts an end to the eternal now of the nonidentical. Constructing objects by defining their spatial and temporal limits, it endows objecthood in the same way it orders time into linear progression: retrospectively. Terminal (but not final) the cut defines the term and the terms of objection, transforming raw perception into an object for consciousness, establishing the object as a perception of which an "I" is conscious. Even though both object and subject come into existence in the same instant, the perceiving I perceives the cinematic object as something that preexists its consciousness of it (since, from the subject's point of view, the object has always been there) and that is therefore always already over. Where the cut instigates endings, the vector enacts beginnings. It gives the moving image a future, the possibility of becoming otherwise than it is. The pixel grounds us in the film as a present experience, the cut in the preexistence of the filmstrip to consciousness of it, the vector in the film as the

becoming of something as yet unseen. It is the principle of transformation, the quality of changing what we expect from moment to moment.

Causality, logic, law, interpretation, and dialogue belong to this emergence, though they are only historically specific modes of the vector, which is the openness of thinking to the as-yet unthought, the connection as yet unmade. In the purest form we have available, the early animations of Emile Cohl, the principle of cinematic thinking is transformation governed only by analogy. Debating Umberto Eco's fictional (1989) and theoretical (1990, 1992) counsels against analogy, Barbara Maria Stafford argues that analogy not only has the potential to provide sudden and vivid insight, as in the works of artists like Joseph Cornell; it is also a principle other than causation or identity that allows us to make connections within and between media (Stafford 1999: 8). Analogy is moreover intrinsic to the paradigmatic axis of substitutions, where ostensibly unrelated words (love, dinner, pots, hay) reveal unforeseen relations when added to the end of the phrase "Let's make. . . ." The analogy between a question mark, a cat's tail and a fishing rod may not be apparent—until you have seen old Felix the Cat movies, where they are liable to turn into each other on the sole basis of visual similarity. John Canemaker catches this quality of the early 1920s Felix: "Dissembling and reassembling his form, Felix is a Cubist cat, a symbol of post-war modernism . . . Felix (especially before Bill Nolan redesigned him) is full of angles that fragment and juxtapose in exciting new ways" (Canemaker 1991: 75). As in Braque and Picasso's analytic paintings of the 1900s, the graphical code works on the basis of likenesses that shift constantly with our perspective on them, so we see a mark as at one moment a tail, at another a question mark, and simultaneously as nothing less magical than a line in motion. The vector thus redefines movement as a function of relations and interactions. Reversing the polarity of the cut, the vector temporalizes space.

The philosopher de Selby of Flann O'Brien's comic novel *The Third Policeman* examines "some old cinematographic films which probably belonged to his nephew," and that, a footnote informs us, he described "as having 'a strong repetitive element' and as being 'tedious.' Apparently he had examined them patiently picture by picture and imagined that they would be screened in the same way, failing at that time to grasp the principle of the cinematograph" (O'Brien 1967: 50).

De Selby's film theory builds on the ancient paradox of Zeno, according to which Achilles, racing against a tortoise, can never catch it because, having given it a start, he must first run half the distance between him and his competitor, by which time the tortoise has moved on. So Achilles runs half the new distance, while the tortoise advances another fraction of the distance, and so on *ad infinitum*. The *ad infinitum* is the critical point. Seeking to prove that the universe is stable, Zeno hit on the concept of the infinitesimal, the ever diminishing approach toward zero that, however, never reaches it: the concept of the infinitely small. Just as you can add a digit to any cardinal number to make it bigger, so you can add digits to a decimal to make it smaller. In Zeno's example, the gap between Achilles and the tortoise reduces from 1 to 0.5, to 0.25, to 0.125, to 0.0625, and carries on reducing, always adding more decimal places, toward a zero that it never reaches. When plotted on a graph, this gives an asymptote, a curve that plunges toward zero but gradually flattens out, never quite arriving at origin.

This asymptotic curve is not composed of points and the distance between them. The real numbers, the infinitesimals that form the "real" line, are more geometrical than arithmetic. They cannot be counted and are often better described as goals toward which the line tends than as numbers. For the mathematics that dominated the first quarter of the twentieth century, undecidability and infinity are inextricably intertwined.[2] According to Alan Turing, founding figure of computing, some arithmetical procedures go on for ever. Turing addressed the "halting problem" through the analogy of an imaginary computer, itself extraordinarily like a machine for drawing animations, being composed of an endless strip of paper tape and a read-write head that would make marks or erase them according to mathematical rules. In the case of an uncomputable sum like the square root of two, the machine will never stop. The finally undecidable numerical value of a point on the real line is the infinite transformational power of the graphic line in cinema. The infinitesimal adds to cinema the unfinished, unending, undecidable metamorphoses of expectation so poetically manifested in one of the earliest of animated films, Emile Cohl's 1908 *Fantasmagorie*.

Spectator, Author, Animator

James Stuart Blackton, one of Cohl's few predecessors, performed *The Enchanted Drawing* for Edison (copyrighted in November 1900) and *Humourous Phases of Funny Faces* for his own Vitagraph company in 1906, both based

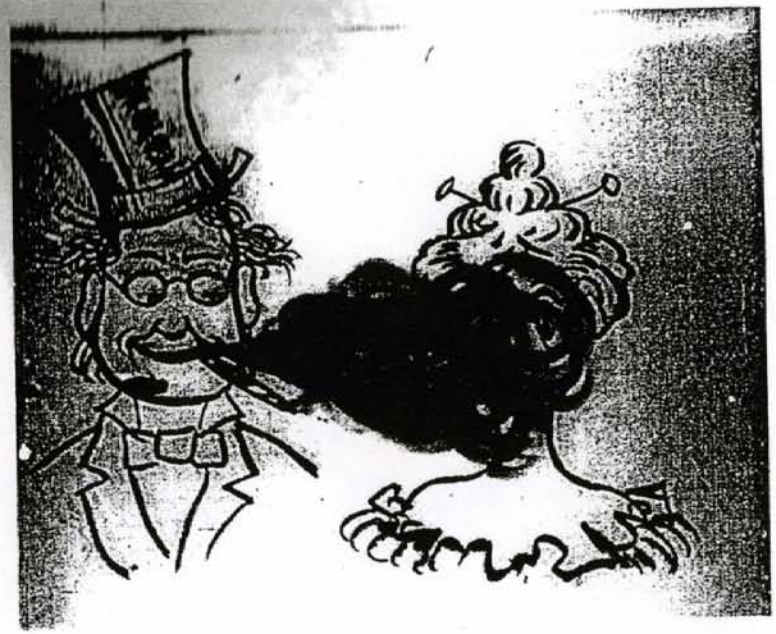
on variety stage lightning-sketch acts. Both films featured the artist prominently as he would have appeared on stage, with the addition of stop-motion effects giving the impression that certain of the drawings drew and animated themselves. In one of the rare accounts of the popular variety acts on which these films were based, Matthew Solomon argues that the protean metamorphoses of quick-change and lightning-sketch artists "quickly came to represent the path not taken by the new medium" of cinema (Solomon 2000: 17). By drawing attention to Cohl's work and to the vector code, I want to offer a counterargument: that the tradition of transformation did indeed enter cinema, and as a fundamental resource, although the prominence given to photographic realism led to a marginalization of its most characteristic form, the cartoon (see Cholodenko 1991; Klein 1993; Smoodin 1993, 1994).

Another commentator, Donald Crafton, writes of Blackton's early experiments that

> the spectator was never allowed to forget that he was observing a theatrical performance. The filmmaker (often represented by his hand) was the center of attention. Yet there were no straight recordings of a performance; each was slightly altered by camera tricks to create a magical illusion. . . . For an artist to be able to bring something to life bestows upon him the status of a privileged being. . . . In the cinema, as Bergson said, movement is life, and the ability to synthesise screen movement was quickly grasped as a magic wand by Blackton and the others. (Crafton 1993, 86–87)

Crafton rightly emphasizes the performative aspect of these early cartoons, but he oversimplifies slightly the philosophical complexity of the cartooning process.

These earliest stop-motion animations address us through the syntax of the cut. The presence of the artist in the first and the drawing hand in the second of Blackton's films cuts by layering the foreground photographic image over the background animation, while the frame edge composes the plane of the drawing, in *The Enchanted Drawing* as a chalkboard and in *Humourous Phases* (fig. 4.1) as identical with the image plane of the screen. Whereas the first film comprises a single gag, the second employs stop-motion not only to give the illusion of self-animating picture, but as a form of editing that allows a compilation of several scenes over its three-minute



| Figure 4.1 |

Humourous Phases of Funny Faces: the transition from lightning sketch to animated drawing. Courtesy BFI Collections.

length. In the transition from *The Enchanted Drawing* to *Humourous Phases*, then, the cut extends its powers to order, control, and provide linearity. But even in the reversal of the process of drawing, when a smudged image becomes clear and begins to undraw itself, *Humourous Phases* never finally breaks with the sheer symmetry of zero's great balancing of the books, emphasized by the conclusion of each scene in the erasure of the image. Charming as they are, these two films of Blackton's only begin the process of exploration that will be brought to fruition a couple of years later by Cohl.

To some extent, through its increased dependence on the cut, *Humourous Phases* pulls back from the full potential of the animated cartoon by signaling its subordination to the syntagmatic structures of both the variety act and of narration. In Cohl's film, however, we witness a series of transformations apparently without cutting. *Fantasmagorie* is a brief line animation

in which a mischievous puppet, Pierrot or *fantoche*, and his environment change seamlessly (see figs. 4.2 , 4.3). Flowers become bottles become a cannon; an elephant becomes a house; Pierrot becomes a bubble, a hat, a valise. The vector of Cohl's line, as it draws and redraws itself, disrespects the frame edge and equally ignores the syntax of layering, most notably in the small "screen" that appears at the left of the image as the action with the woman in the hat takes place. Not only does this appear to reprise the scenes that we have just watched, but it also lies on an axis of depth from which the other characters are debarred. For example, when the little Pierrot gets bigger, it is not because he is closer to the virtual eye of the rostrum camera, but because he has been inflated. Likewise, the sword-wielding giant shares the same plane as the Pierrot. However, it is not simply that the rules of the cut are being broken: rather, *Fantasmagorie* obeys another set of rules in the same way that the real line is bound by laws other than those of Euclidean geometry.

Cohl's line is the same one that, a mere thirteen years later, Klee would describe as going for an aimless walk (Klee 1961: 105). It is the activity of the line that counts, rather than the end points, which are in effect determined after the fact rather than before it, the result of drawing, not its givens. Klee, of course, was able to exhibit only finished drawings: Cohl could show in the cinema the active vector of the line that draws itself. Much more than an idiosyncratic technique, his constantly permutating line is a literal transcription of the linear motion of the filmstrip taken as a line that is always open to alteration, a motion without destination, open to every distraction. In the cut, the structure of linear motion is complete: in the vector, it is undecidable. As the grid provides the unstable basis of motion between images, the vector provides the transformative principle in the frame itself, so every moment of every frame is the result of a unique transformation that might have come out differently.

Linguists use the term "paradigmatic" for the rules for substituting one word for another. The rules of syntax govern the structure of meaningful sentences. The structure of "My life is an open book" is the same as that of "His cat is a wicked creature" or "Your teeth are ivory castles." What differentiates them is the substitution of "his" and "your" for "my," and "cat" and "teeth" for "life." Linguists speak of grammar as the syntagmatic axis and imagine it as a horizontal line, rather like this line of print. The paradigmatic axis is correspondingly the vertical axis, like the reels on a slot machine, allowing us to select which word to put into the slots created by the syntax.

Paradigmatic rules govern matters such as the substitution of nouns by nouns (in the first sentence, we could substitute for "life" words like "face," "husband," "novel," "bank account"). In Cohl's film we witness the cinematic equivalent. At any point, the line permits its transformation into anything that can be depicted as a line. The rulebook Cohl adopts, and to which he submits his creative process, stipulates that the line is always the same thickness and that it describes objects and planes only in outline. Given those rules, the metamorphoses are potentially infinite, limited only by external constraints such as the length of the film roll and the economic necessity of finishing in order to show it and earn some money. To gain this freedom, Cohl sacrifices the grammatical structures that had proved so profitable, artistically and financially, in the cinema by 1908: editing, narrative, staging in depth. This is why *Fantasmagorie* is so wonderful to study: it is a film within a hair's breadth of being governed by the paradigmatic code of the vector alone.

In a brief account of the film, Paul Wells emphasizes the element of chance in the vector code:

> Cohl employed a technique in line drawing where the lines would fall randomly into the frame and converge into a character or event. Cohl's *incoherent cinema* was essentially the free flow of seemingly unrelated images in the stream-of-consciousness style of the Modernist writers. Further inspection reveals an implied, and more significant, level of relatedness in the imagery, prefiguring later animated films which trust the elements intrinsic to animation, chiefly, the primacy of the image, and its ability to *metamorphose* into a completely different image. Such metamorphoses operate as the mechanism which foregrounds this new relatedness by literally revealing construction and deconstruction, stasis and evolution, mutability and convergence. Such imagery did not operate as a set of visual tricks or jokes, nor did it constitute a conventional literary narrative, but was a kinetic construction wholly determined by the choices made by the animator, relating images purely on his own personal terms, sometimes by obvious association, sometimes by something entirely within the domain of his own psychological and emotional involvement with the visual system. (Wells 1998: 15)[3]

Wells reads his history backward, crediting Cohl with an inchoate understanding of the anthropomorphisms of Felix the Cat and Gertie the Dinosaur, as though Cohl's permutations of the line are best understood as

| Figure 4.2 |

Fantasmagorie. Four years before Griffith's *Those Awful Hats*, Cohl satirizes women's headgear. He not momentarily describes 3-D space, only to redefine it as a pure surface in the next metamorphosis. Reproduced from Crafton (1990) with permission.

[illegible] the mature cartooning of animations like *Felix the Cat in the* [illegible], in which a burglarious chicken jimmies open a window with an [illegible], and Felix lassoes the culprit with the outline of a pond. [illegible], however, Wells also emphasizes that Cohl's roving, weaving [illegible] into the kind of solidity enjoyed by Gertie, Felix, Mickey, [illegible]. And although the reference to deconstruction suggests a [illegible] associating *Fantasmagorie* with the zero of instigation [illegible] Crafton, Wells's reference to stream of consciousness [illegible] not to Derrida but to Bergson, if not to William [illegible] the endlessness of metamorphosis in an authorial [illegible]

Three major arguments are raised against cinematic authorship: that filmmaking is social production; that any artisan is as much the tool of her craft as vice versa (Barthes 1977a); and that the construction of authorship is a mode of cataloging with no more and possibly less relevance to a text than its date, publisher, geographical origin, or any one of a hundred other determinants (Foucault 1979). However, if it is the case that a film is a product of social forces, then film scholarship cannot ignore the critical importance of individuation as a result of social process, however unwanted or illusory. The issue has been raised by many feminist and antiracist scholars, appalled that the academy should abandon the concept of authorship at the very moment at which women, African Americans, British Asians, and other ethnic groups have achieved significant recognition as cultural authors. Their argument is significant here because, as Adorno argues, art is compelled "to undergo subjective mediation in its objective constitution" (Adorno 1997: 41).

In fact, for Adorno, this is an integral element of modern art, which takes up the task of negating the atomism of a divided and individuated society: "If the artist's work is to reach beyond his own contingency, then he must in return pay the price that, in contrast to the discursively thinking person, he cannot transcend himself and the objectively established boundaries" (ibid.: 42). Unlike philosophy, art cannot transgress the borders of reality, nor can the artist pretend to have negated his own subjectivity. Instead, the passage through the individual author actually strengthens the claims of art to communicate the social, something it could not do if it were free of the individuation that so deeply marks contemporary society. Crafton's brilliant biography of Cohl is important not because it reveals the deep psychology of the "stream of consciousness" that Wells believes in, but because it situates that creative mind in a historical society whose traces are deeply marked on Cohl's career and creations. Adorno casts further light on the temporalities of animation when he concludes that "every idiosyncracy lives from collective forces of which it is unconscious" (ibid.). The intimate personality of a mark, the idiom that allows us to recognize a Klee or a Picasso line, is an articulation not of an irreducible and total personality but quite the opposite: it sums all those social and historical forces that congregate in the idiosyncratic act of making, even in the decision to make, in the artists' understanding of why and how they make, in the very movement of the hand.

The film's innocence of narrative coherence is a function of its innocence of key frames. Later, more industrialized animation studios would direct their leading animators to provide frames that defined the beginning and end of a motion. Junior staff would then be hired for "in-betweening," drawing only the frames required to provide a smooth transition between key frames. In Cohl's case, there are no key frames: no line's action is ever complete, but metamorphoses into the next without the stability and unification afforded by key framing. At the same time, these are not just doodles but drawings in the process of becoming pictures *of* something. The distracted, dreamy reverie of the pixel immerses us in the Real, the referent in Saussure's semiotics. The syntax of the cut transforms these sensations into signifieds, representations, the chain of cinematic objects. The vector is the dimension of the signifier: "Pierrot" becomes the wending line. The signifier is the material of signification, and its task is not to represent but to be exchanged. Because Cohl's line is a line, a material signifier, it can exchange signifier for signifier, on the principle of analogy. It is the token of exchange between object and object in metamorphosis, and so adumbrates the exchange of subjectivities that is communication. Cohl's line is not his consciousness materialized, but the medium of social exchange. It does not represent: it communicates.

At every moment, Cohl's paradigmatic signifiers may become other than they are in the present. The meaning of this shape depends on the substitutions and transformations to which, as material signifier, it is open. The vector of *Fantasmagorie* is never complete. So it has to change interminably—and so does its interpreter. It is as if the vector's subjectivity is constantly launching itself outward, like a child playing, or even more like a playground full of children racing from game to game, persona to persona, utterly invested in what happens next. The cut anchors motion in destiny, in the necessity of an ending. In the vector, there is nothing behind—everything is in front. Mathematically, the pixel is perfectly symmetrical: the same in any direction. The cut breaks that symmetry by establishing the principle of being: what has become. The cut is teleological, determined by its ending. The vector breaks it on a different axis, treating what is as the beginning of becoming. The vector is eschatological: its future is open, governed only by hope.

Fantasmagorie is not, then, a simple stream of consciousness. Instead, that stream is the raw material for a job of work, subjecting the preconscious

firstness of undifferentiated sensation to the machinery of production. If we try to imagine Cohl's stream of consciousness, we have to imagine him contemplating how the public and, differently, the producer will respond; how to get around the constraints of his technology; submitting to fatigue and the economic imperative to stop. In all these moments, our imaginary Cohl inhabits a nexus of exchange, with living customers, with networks of trade, with the dead labor embodied in chalk, chalkboard, camera, and rostrum. Mere firstness would produce nothing but a chaotic scribble. Mad scrawling would merely flag a pretended liberation from individuation, but one in reality still governed by the rational image of individuation: a resistance that depends on the dominant that it resists.

Cohl's animation, however, neither succumbs to the administrative principle of the cut (secondness would imply simple depiction, in the mode of Winsor McKay), nor pretends to a schizophrenic loss of subjectivity. Instead it reaches out from the unhappy mismatch between the universality of preconscious difference and the particularity of ordered unity, toward a freedom they cannot achieve separately or together, but toward which their struggle necessarily points. This is not the freedom of the "free" market or "free" choice, terms that scarcely mask the monopolistic character of contemporary capitalism. Rather, it is a capacity to exist otherwise than under those conditions. Only by accepting the subjective role of individuality in authorship can we understand how it can be overcome: not by regression to infantile states, nor by the simple negativity of irrationalism, but by constructing semantic behaviors that at once expose the social failure to reconcile chaos and order, preconscious and reason, and at the same time produce techniques for another way of making that is subservient to neither and that, although it can neither reconcile nor negate them, poses the possibility of meaning.

It is easier to make this case for Cohl than for most subsequent filmmakers. As an artisan, he had far greater control over the processes of filmmaking than any studio-based producer. But there is a third level to the subjectivities involved in the making of *Fantasmagorie* that makes it an especially fruitful study. It is possible Cohl had seen the Blackton films. Certainly he was fascinated by cinema, and as an active participant in the Bohemian life of Paris for thirty years prior to his first films he would have been technologically and scientifically literate. Nonetheless, his practice in making *Fantasmagorie* must have been almost purely experimental. What

speeds to move things at, how long to hold a frame or a pose, at what pace to render a transformation: all of these he must have been experimenting with as he went along. He would not have been able to view any of his work until all the drawings had been made and photographed. Is this a human psychology at work, or the liberation of an entirely modern sensibility through the subordination of will, of authorial psychology, to the agency of technology?

The Lumières' negotiations over the supply of film stock documented in their correspondence makes it clear that they could have gone for square or circular frames, or the portrait format of many of their autochromes. Certain technical constraints made it simpler to go for the landscape format still ubiquitous today. Like the mechanism of the sewing machines incorporated into the cinematograph's claw mechanism for film transport, the rectangular frame fixes, as fixed capital, the dead labor of generations of handicraft. But like the anonymity of the printing press and the adding machine, that fixing bears also a gift of autonomy. In the new machine, dead labor is restored to new life. The invention of offscreen space is not a product of human ingenuity but of a new mode of life: the human-machine hybrid built on the anonymous autonomy of the machine and the autonomous anonymity of the industrial worker under commodity capital. The conditions of modernity prized invention and inventiveness above all, because they helped the acceleration of consumerism on which the new wealth was predicated. The ensemble of economics, technology, and the anarchic modes of Lyons syndicalism in the Lumières, old bourgeois carnival in Méliès, and Parisian bohemianism in Cohl combine to form the apparatus of cinema. That apparatus, with its doorway through which consciousness can enter and reside mesmerized, as producer as well as audience, crystallizes the contradictions of attentiveness and distraction into a single productive machinery of delight.

In Cohl, the result, as so often in computer media, is an expression of wonder at the new relation with machines. The latest gift of the technologization of the media circa 1908 was freedom from psychology. The attention devoted to physiological and unconscious reflexes, to hypnosis and the psychoanalytic unconscious, especially in its more mechanical "economic" model, help pinpoint this as a moment at which excitement and invention arose neither from consciousness nor from fantasy but from an autonomy granted to the interface between craftsman and tool. By 1908, this tool was

already a complex and quasi-autonomous machine—Fox-Talbot's "pencil of nature"—capable of partnership in the creative act.

Fantasmagorie is the product of a kind of willful ignorance achieved through the submission of the willed act of drawing to the unmanaged operation of machinery. At the same time, because it is no longer the object of control, the machinery itself sheds the role of relation of production, which it occupied in the industrial factory. In Marxist terms no longer a relation but a force of production, the camera enables Cohl to rid himself of both the irrationalism of preconscious difference and the instrumental rationality of socialized technologies of production. The autonomy and anonymity of Cohl's line should not be confused with randomness: they are achieved only through the thoughtful and decisive acceptance of determinations external to the work itself, since that is the only way those determinations could be superseded and a new, distinctively modern mode of cinema be produced. The secret consciousness of the vector is this human-mechanical hybrid. Hence we can no longer speak of the author as originator of the cartoon: instead we are confronted with the animator, no longer a subject of the social world, but an exile seeking asylum in the machine world from all demands external to the work itself. We might think of the animator as the subjectivity of the text. For both audience and author, consciousness is an external factor that is nonetheless intrinsic to the making and experiencing of the film. From the point of view of the film itself, however, history enters the film through cyborg authorship and socialized interpretation, qualities that are as much raw materials as light and time. For the author, the time of making is a time in which the future becomes past; for the spectator, one in which the past becomes future; but for the animator, the present is the bifurcation of all vectors, the moment of autonomy.

It is, however, only a moment. Where the ancients disputed the necessity of ontegeny with theories of autocthony and parthenogenesis, since the birth of cinema we moderns maneuver at the unclear frontier between human and machine. But like the metamorphoses celebrated by Ovid two thousand years ago, where the human-animal border is crossed in joy and in pain, the beauty of the animator's autonomous present must be ephemeral: its pleasures must be fleeting so that we can know that cruelty too will pass. In this sense, ugliness, as the grotesque and as depicted violence, is the last bastion of representation, the remote picturing of the savage necessities of contemporary life. In the digital era, these are characteristically enacted in

the paranoid-depressive movie of the data-image, in films like *The Net* and *Enemy of the State*, and the manic-psychotic movie of technology out of control, of which *Terminator 2* and *The Matrix* are only the best known. Their concern, which can be traced back to *Fantasmagorie*, is with a fleeting present in which distinct definitions of human and machine are not possible, a moment of semantic and categorial play intrinsic to the mimetic precisely at that point where it is no longer representational, a point at which the criterion of resemblance is most at risk.

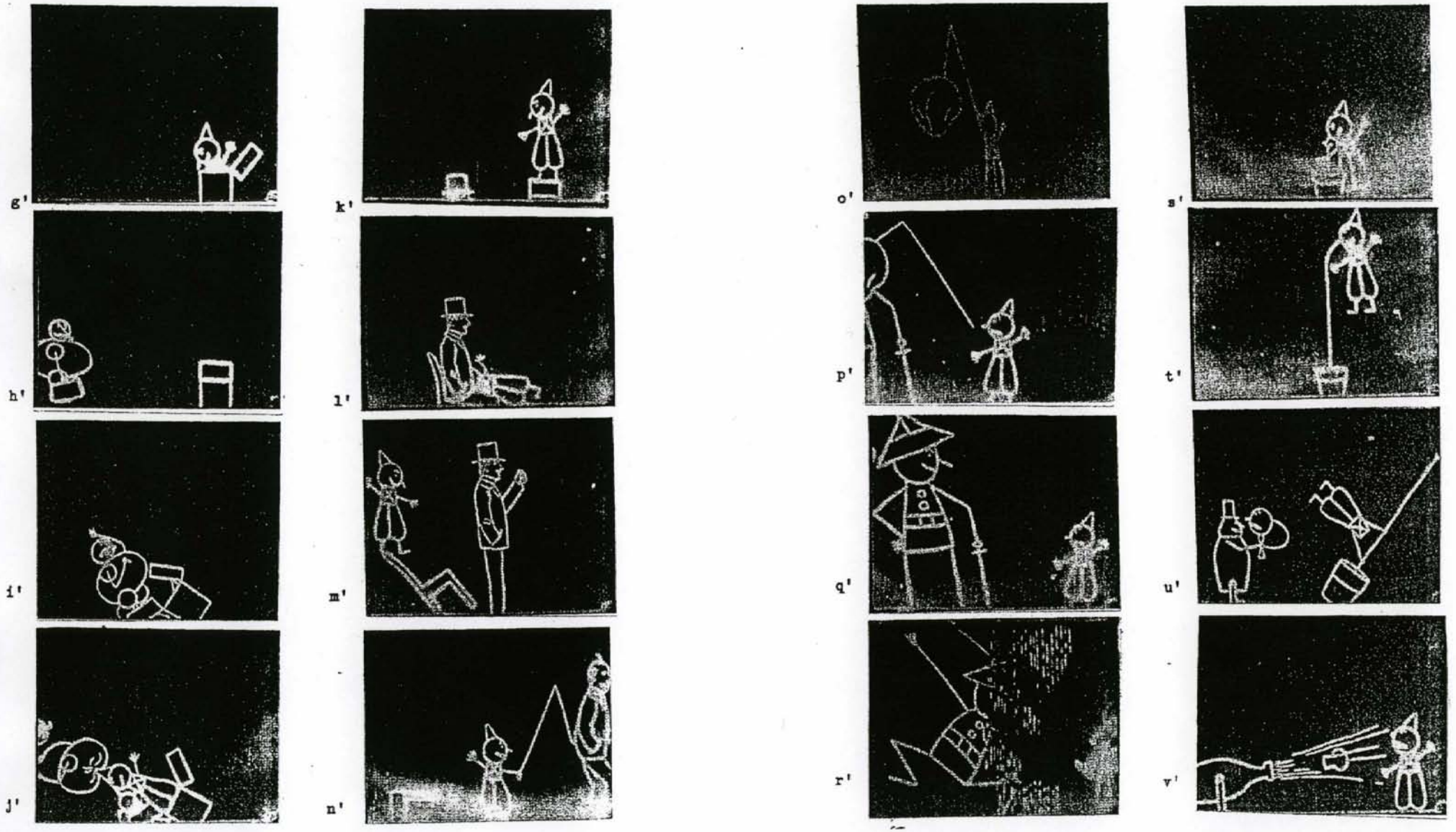
In Cohl, we can trace the genealogy of this indistinct human-machine relation. The vector in *Fantasmagorie*, the unstable, ephemeral line, moves into and away from resemblance in a constant play of instability. We ask repeatedly what the line is becoming, but have only the briefest moment for the pleasure of recognition before it changes again. What we witness here is the moment at which naming occurs, but a naming that is already subject to the paradigmatic substitutions that underlie all interpretations. The meaning it produces—the kind of meaning that allows us to recognize the line as a horse or a spider—is itself ephemeral. In this way, though the film itself is limited to its fifty-second duration, Cohl's line demonstrates that the possible substitutions are infinite in number. Becoming signified, the line is unfixed. It is a lens through which pass the infinities of interpretation.

Dynamics of the Vector

For Adorno, the world was already negative, degraded by its very modernity. Art's task was to negate that negativity. For us, however, at the dawn of the twenty-first century, the world's negativity has already been negated by the engulfing denegation of the commodity form in the society of the spectacle. For all their pessimism, Jean Baudrillard's analyses of contemporary (Western) society as a simulation machine make a powerful case for the loss of the world. Baudrillard believes that reality was constituted in the differences between real things; but under the conditions of serial production, there are no longer any differences between things (Baudrillard 1993a: 55). Worse still, the same is true of communication: "Communication, by banalizing the interface, plunges the social into an undifferentiated state" (Baudrillard 1993b: 12). The proliferation of identical mass media messages, the mass production of public opinion, the unchanging frame of the browser window or the VDU, the obligation to participate even when we have nothing to say, all conspire to produce a hyperreal social process in which all communications are undifferentiated and to that extent unreal. In the digital era, according to simulation theory, the world has been transformed into data, and the data has negated the world. But if the world has already been negated, art that seeks to negate it again is only doing the work of simulation. Therefore art can no longer afford to be negative: in our time, art's work must be positive.

The vector is critical to this reorientation of cultural work as a positive production of meaning and, since all meaning depends on shared communication, of society in a time when, as Baudrillard argues, the social itself has been derealized. In this light, we should not read the absence of keyframes in *Fantasmagorie* as a negation of editing. Rather, it is the positive depiction of the act of drawing at the moment when the work of representing hangs in the balance between resemblance and the pure mark. Without keyframes to anchor it in a unified shape, the mark achieves a determined autonomy in which its resemblance to objects in the external world is constantly in question and so both open to the uncertainties of interpretation and anchored in the social from which its idiosyncracy arose and where all interpretation takes place. The idiosyncracy of the line as a trace of its maker and the idiosyncracy of infinitesimally graduated differences in interpretation are the social grounds on which cinema moves from the presentation of objects to the stimulation of concepts. The vector does not tell us what to expect: it requires us to think. In this way the vector brings us into the realm of the intellect and offers us the delight we take in the pursuit of meaning. The vector is the art of curiosity.

Cohl's mobile mark, the animated line as a visible and visual practice, is a device of metamorphosis, in which the emphasis should lie on the prefix "meta". As metamorphosis (and as opposed to the computerized technique of morphing), the line is not the "in-between" of two fixed states or two anchored points but the action of becoming that may or may not result in a fixed state such as a keyframe. The grid depends on the copresence of undifferentiated viewer and viewed; the cut organizes the indifference of flux into being by separating viewer from viewed in the subject-object relation; the vector depends on the recognition of the autonomy of both viewer and viewed. It extends and deepens the separation of the grid by instigating a recognition of the object as other rather than as dependent on the viewing subject. Keyframes anchor the changing line at moments of cutting, for example, in the identifiable faces between morphs in the Michael Jackson



| Figure 4.3 |

Fantasmagorie: endless permutations of the line in perpetual transformation.
Reproduced from Crafton (1990) with permission.

video *Black or White*. By contrast, the struggle to recognize and name the metamorphosing line in Cohl, always incomplete, never settles in identity but constantly remakes the relation between subject and object as that between self and other. In this way it cannot, as the Jackson video does, suborn the technology of morphing to commit to a color-blind ideology of liberal multiculturalism (Sobchack 2000; on multiculturalism, see Zizek 1997; Araeen 2000). Instead it confronts the uneasiness of the viewed with its status as object of the view, forced by its endless mutation to recognize its autonomous existence, an autonomy that at once confronts the viewer with the limitations to control and with her own instability.

The autonomy of the line in *Fantasmagorie* is, as we have already seen, a product of the relation between Cohl and his apparatus. On a certain understanding of the technological relation, for example, that voiced by McLuhan (1964) when he describes tools as extensions of the hand, the relation between human and machine is purely one of control. The machine is an instrument of humans, and that instrumental relationship defines the user and the used as subject and object. What Cohl's practice reveals is that another relation is possible, one in which the privilege of subjectivity is abandoned in favor of granting an autonomy to the machine equivalent to that assumed by the user. The new relation between human and machine is then no longer instrumental but ethical, in the sense advanced by Emmanuel Levinas, since it demands a mutual recognition of each other's right to be, beyond the relationship itself. No longer dependent on Cohl's authoring control, the machine is free to collaborate in the creation of the work—or to refuse, as is so often the case when we try to enlist the aid of a recalcitrant computer in some task we are unsure of. This is not to ascribe intelligence to the machine, but to emphasize that it is capable of rich and complex relationships with humans. The pacing of the transformations in *Fantasmagorie* is one such example of machinic contributions to creativity; another is the possibility of animated drawing.

The last remnant of the older lightning-sketch acts in Cohl's film is the appearance of his hands. The very appearance of the hand in the opening shot of the film is a conundrum. According to Crafton (1990: 121, 140) and Abel (1994: 286), Cohl drew the bulk of the film in black India ink on translucent white paper over a lightbox and then printed the film in negative to achieve the white-on-black effect. The effect of the hand drawing the *fantoche* in the opening frames must have been shot by another method, and differently printed, so that the hand would not appear in negative. So the moment at which the hand withdraws and the drawing comes to life is also a moment in which the film process is reversed, as must also be the case with the second entry of the hands when they appear to reassemble the broken *fantoche* after his fall from the house. The first of these moments is the equivalent of the moment of shock when the still projection of the Lumière cinematograph suddenly began to move; but it is a new effect in the sense that the transition to a purely machinic vision (negative) and to an animation without the support of a visible maker introduce the sense of the cinema apparatus as autonomous participant in creation.

The drawing hand in the opening frames and the mending hands later on can also give us a sense of the structure guiding the relations between human and mechanical collaborators. In the latter case in particular, we are confronted with the three-dimensionality of the *fantoche* who, though flat, can be picked up. There is of course a self-reflexive joke here, but at the same time we are offered a second way of viewing the film. The movement between animated and photographed actions works on the paradigmatic axis, integrating two diegeses, one the fictional world of the drawings, the other the "real" world of filmmaking. Whereas the first entry of the drawing hand is explicable as a throwback to the lightning-sketch genre, the second adds a whole new axis to the film, attributing autonomy to both the *fantoche* and the maker in addition to the autonomy of the apparatus. This is effected through a paradigmatic substitution of real for drawn hands in an action parallel to the cubist application of found papers (newspaper, wallpaper, labels, tickets) in Picasso's and Braque's breakthrough *papiers collés* of autumn 1912 to spring 1913. One of the effects of the substitution in cubist collage was to assert the independence of the world from the artist, who no longer translated it into paint, but could apply items from it directly to the surface of the work. In the cubist case, this also entailed alertness to the fact that these cut-out pieces of printed material were already signs, already artifacts of a thriving visual culture. In Cohl's case, the gluing hands admit that they too are already a part of the apparatus of cinema. They disrupt the grammar of the cut, but only to extend the capabilities of film.

There is no documentary evidence that these are Cohl's hands, certainly, but they are presented generically as the hands of the maker. The presence of the photographed hand for that instant at the beginning of the film is thus a kind of signature, but one that presents itself in the act of

disappearing in a process of subordination to the autonomy of machine. The hand as motif returns in the final frame, but now as a drawn hand, as the *fantoche* waves to the audience from his horse. The whole film, then, moves from the hand as instrument of control—the photographed, authorial hand—to the gesture of waving goodbye, from authorial power to spectatorial address via the autonomy of the relation, embodied in the *fantoche*, between maker and apparatus. By reserving the act of mending for a photographed moment, the film reasserts the partnership, and appeals to an ethical commitment of the maker to the creation, as that creation takes on a life of its own. That act allows the spectator to enter into the role of the person addressed by the film. As Sobchack argues, this is a critical instance in cinema, one in which the recognition of the film as a body that signifies is also one in which we recognize the film as an other: "Thus, while still objectifying visual activity into the solidity of the visible as does the photograph, the cinematic qualitatively transforms and converts the photographic through a materiality that not only claims the world and others as objects for vision but also signifies its own bodily agency, intentionality and subjectivity" (Sobchack 1992: 62).

In Sobchack's semiotic phenomenology, the photograph belongs to what I have here been calling the regime of the cut. The "cinematic," which in this instance equates to the concept of the vector, moves beyond objectification toward a process in which the film is able to take on the task of signifying. As a material body that signifies, film becomes an other. Only at this moment does the cinematic subject become a self, capable of social relations. This is when the vector socializes film.

The Cinematic Sign

The first evidence of the vector's socialization of the cinema is interpretation. Film always calls on us to interpret it. In the case of *Fantasmagorie*, where the activity of the vector is controlled to only the most limited degree by the structure of the cut, that interpretation is not governed by gestalts that order and predestine our negotiations with the text. Rather, Cohl's film activates a constant engagement of the viewer in guessing not only "what happens next" but "what is it doing now," inferring the agency of the film itself. Even such a rigorously minimal figure as the *fantoche* can evoke emotions of sympathy, extending beyond identification to action, encoded in the mending of the broken puppet. More specifically, the film calls up a series

of responses that take the form of a running commentary on the film, an inner speech.

The notion of cinematic inner speech was first broached by Boris Eikhenbaum in 1927. Reading silent film as a syncretic form of photogeny (defined as "an art which uses the language of movement" [Eikhenbaum 1974: 17]) and montage, he sees it overcoming the medium-specificity of the older arts, and evoking in its viewers an inner speech that comments on the film, its phrasing, its metaphors, and the gaps between shots. This inner speech "is much more flowing and indefinite than uttered speech" (ibid.: 16), and it "is not realised as an exact verbal formulation" (ibid.: 31). As Paul Willemen notes, this inner speech is compounded of iconographic, symbolic, and visual codes as well as verbal ones. Citing Vygotsky's (1962) argument that inner speech is characterized by a tendency to omit the subject of the sentence while emphasizing its power of predication, Willemen argues that inner speech's blending of visual and verbal presentations in an internal dialogue on the one hand establishes the internal dialectics of the viewer's psyche and at the same time becomes "the cement between text, subject and the social" (Willemen 1994: 42). The process is clear to anyone who has attempted a frame-by-frame analysis: we say "the line does this," emphasizing the predicate, not the subject that does the predicating. Eikhenbaum's argument is that this is also true of film, which shows us events and objects without implying a someone who does the showing. This isomorphism subsumes the moment of subjectivity enacted in the cut to its disappearance in the communication of meanings.

The vector's particular future-directed temporality addresses us no longer as termini but as media: as people who make sense, but only as nodes in interweaving trajectories of signification. It is no longer a matter of recognition, of deciphering what is already encoded. Rather it is a matter of reinterpreting, of adding a new spin to a trajectory that has not yet realized itself. The vector is the regime in which the temporality and the labor of *making* sense is paramount. If in the pixel we are engaged by an undifferentiated union with the visual, and in the cut by the subjection-objection pair, in the vector we confront the double presence of the screen image as at once object and image, such that what we normally expect to be true of the object—for example, that it possesses a single, discrete, and stable identity—is no longer the case. No longer pointing to an entity separate and opposed to us, but offering itself as medium, the image becomes cinematic sign. Like

every sign, it implies the existence of other signs. To say of one of Cohl's lines that it "is" a flower, an elephant, or a house is inaccurate. On the one hand, it is only legible as referring to (conventional images of) flowers, elephants, and houses for brief moments in a trajectory that is never stable. On the other, it is always a line, a signifier, which is what gives it its transformative power.

The line, like the written word, speaks to us simultaneously as the drawn/written and as the act of drawing/writing, as iconic sign and as the incomplete, infinite process of signifying. Thierry Kuntzel voices this in a rare theoretical essay on animation, arguing that photographic frames reproduce, but animated frames produce. Distinguishing between the grid of the filmstrip laid out for analysis and the film-projection we experience in the cinema, he describes the function I have been terming the vector thus: "The animator conceives the film-strip (each photogram, the articulation between the photograms) in relation to the film-projection and in relation to a meaning which movement will actually bring about" (Kuntzel 1979: 52). Meaning is a function of the transition from the découpage, the analytic eye of the editor, to the trajectory of movement, brought about in the relinquishing of the animating hand to machinic projection.

In the graphic code of the vector in *Fantasmagorie* it is possible to descry that rare creature, a signifier without a signified. Cohl's cyborg cinema approaches Peircean thirdness, "synthetic consciousness binding time together, sense of learning, thought" (Peirce 1991: 185), at its purest. The cut established signifieds as the products of subject-object relations, grounded in the resistance of the world to consciousness. Divorcing perceiver and perceived, it establishes time as a serial process of distinct causes and effects, hidings and revealings, insides and outsides. The vector synthesizes the multiple times of transformation into a trajectory that engages the delight we take in thinking the ambiguities and ambivalences with which it flavors the rough parceling of the world in the cut. In Peirce's terms, the cinematic sign is a symbol, "any utterance of speech which signifies what it does only by virtue of its being understood to have that signification" (ibid. 240). *Fantasmagorie* is such an "utterance," dependent on interpretation, on the active participation of the viewer in its production, and otherwise merely a redundant collection of scribbles. Explaining thirdness, Eco speaks of a line drawing of a circle and some inverted Ws, denoting sun and birds: "First I had to

decide that they were two signs that stood for something, and only afterward did I try to understand them" (Eco 1999: 386). The first moment is that of secondness, of identifying the marks as objects that denote. Only in the subsequent moment of thirdness do we arrive at *what* they denote. This movement of subjectivity from recognition to mediation is the achievement of *Fantasmagorie*.

The cinematic object does not require this interpretive moment, but the animated vector depends on our synthetic participation in its becoming, on the viewer's temporality (and on the apparatus's). As exchange, the signifier represents a subject for another signifier: it is a passage from subject to subject. But by the same token, subjectivity never originates signification. Instead it too is a passage that focuses and distributes signification, the animator of a vector of signification that flows through her (from the point of view of viral language, "I" am only a medium for reproduction and mutation). In this way, too, the cinematic sign leads us toward the socialization of vision at the point at which cinema becomes Symbolic.

Lacan thinks of the Symbolic (for which I will reserve the initial capital) as the order of both consciousness (the "I") and of language, social systems, and all structures that enable meaning and communication. Entry into the Symbolic comes in the Oedipal moment in which the child first internalizes the psychoanalysist's founding rule: the prohibition against incest. Whether one accepts the specific instance or not, Symbolization depends on passing a threshold when first we learn that socialization is governed by rules. Following the mirror phase, in which the infant acquires the ability to identify with his or her own likeness narcissistically, the Symbolic constructs the more abstract sense of an ego marked by the word "I." But because this word is used equally by any conscious speaker, the Symbolic permits an extension of identification beyond identification with oneself, toward identification with an other.

Though Lacan's pessimistic account of socialization sees this process as one of loss, instilling a permanent and ineradicable sense of lack in the human adult, there is nevertheless a gain. From indifferent immersion in the world, via a narcissistic (and sadistic) separation between subject and object-world, we emerge into a socialized universe. If for psychoanalysis, with its individualist premise, this represents a loss of primal unity, for a more social theory it marks the acquisition of those fundamental communicative skills

that allow us to enter into relationships not just with ourselves but with autonomous others. *Fantasmagorie*'s multiple acts of cruelty and the penultimate act of kindness (mending the puppet) might be read allegorically as an account of that Oedipal transition from the isolated self as pure and static image in the opening frames, through confrontation and breakage, to a submission to the other (the photographed hands) that enables socialization (the *fantoche*'s final wave to the audience).

Of course, this allegorical reading is very much an interpretation after the fact. Crafton's careful analysis (accompanied by an invaluable set of 69 frame stills documenting the film) emphasizes the cruelty of *Fantasmagorie* (Crafton 1990: 258–266). Both he and Abel (1994: 286) stress the spontaneity and fluidity of the images as analogous with dream states. Wells, as we have seen, stresses the authorial stream of consciousness. Bendazzi contrasts Cohl with his North American predecessor Blackton, who "was always careful to introduce or justify the presence of a cartooned world next to a real world. On the contrary, the Frenchman jumped into the graphic universe, animating the adventures of autonomous characters" (Bendazzi 1994: 9). None of these accounts, with the partial exception of Crafton, is moved to analyze the film as narrative. Reading *Fantasmagorie* as a story is subsequent to experiencing it as a formally (but never absolutely) autonomous signifying agent.

In a discussion of the foundations of a philosophy of space, Henri Lefebvre raises the specter of autonomy in the context of the commodity:

> *Things*—which for Marx are the product of social labour, destined to be exchanged and invested for this reason with value in a double sense, with use-value and exchange-value—both embody and conceal social relations. Things would thus seem to be the underpinning of those relations. And yet, on the Marxist analysis, it is clear that things *qua* commodities cease to be things. And inasmuch as they remain things, they become "ideological objects" overburdened with meanings. *Qua* commodities, things can be resolved into relations; their existence is then purely abstract—so much so indeed that one is tempted to see nothing in them apart from signs and signs of signs (money). (Lefebvre 1991: 402)

Lefebvre's missing underpinning, neither Logos nor empiricist materialism, is communication: the primacy of relations, even though those relations are expressed in the autonomous form of signifiers that, in cinema, take on the commodity's monstrous property of repeating relations back to people in the guise of objects. The fluidity of *Fantasmagorie*'s metamorphoses enacts the resolution of commodities back into relations, relations of mediation, signification, and communication that perpetually test the limits of and propose alternatives to the dominance of money as the signifying chain par excellence that governs communication under capital.

To confront the autonomy of the signifier is to come face to face with the film as other. In the philosophy of Emmanuel Levinas, the confrontation with the other is the foundation of ethics in a transition from freedom to socialization. The subject is free in the sense that it is "for itself," but this comes at the price of solipsism: "in knowing itself or representing itself it possesses itself, dominates itself, extends its identity to what of itself comes to refute this identity. This imperialism of the same is the whole essence of freedom" (Levinas 1969: 87). The knowledge the subject has of itself is a mode of representation—the cut—that allows it to control both its world and itself as objects. Confronted with the other, the subject becomes self in recognizing the limits to its sameness, its control and its freedom. It does so because in the other it is forced to recognize another's freedom. "Morality begins," argues Levinas, "when freedom, instead of being justified by itself, feels itself to be arbitrary and violent" (ibid.: 84). The ethical arises when the subject confronts an object that is as free as itself, a confrontation with the other that brings with it the realization that domination over the object is at once arbitrary and homogenizing. Recognizing the freedom of the other limits my freedom, but freedom can have no limits. Therefore the self is not free, but forced to take the other into account, to be responsible for the other, since the other defines the limit of freedom.

At the same time, knowledge of the other alters our relations to the world. "Certitude rests, in fact, on my freedom and is in this sense solitary" (Levinas 1969: 100), whereas "the locus of truth is society" (ibid.: 101). Certainty that we possess the unique and absolute truth belongs to the order of the subject, but connection with others opens to us the limits of certainty, since they too have their own and different certain knowledge. The possibility of truth then depends on the society of interpretations, on mediation. Certainty is a kind of destiny: it determines what it is possible to know, by defining the world as the object of a subject and subordinating it to that

subject's identity. Thus, apparently paradoxically, freedom is synonymous with necessity, whereas responsibility, duty, and care free the self to the possibility of change.

For Vivian Sobchack, this confrontation with the other occurs also in the cinema: "What we look at projected on the screen . . . addresses us as the expressed perception of an anonymous, yet present, "other." . . . [T]he concretely embodied situation of the film's vision also stands *against* the viewer. It is also perceived by the viewer as a "There where I am not," as the space consciously and bodily inhabited by an "other" whose experience of being-in-the-world, however anonymous, is not precisely congruent with the viewer's own" (Sobchack 1992: 9–10). We can see here why Wells so easily slips into reading *Fantasmagorie* as evidence of a specific human other, the author, Emile Cohl, because film presents itself to the viewer as an other capable of signifying and thus possessing its own freedom. But the film is more "other" even than that. It is not the sole product of an author but evidence of a cyborg integration of human and machine into a signifying apparatus. It is that apparatus that confronts us as the other in vectoral cinema.

The certitude we bring to the identification of the world as object or collection of objects is, in Levinas's terms, thinking in the mode of totality, "a reduction of all experience, of all that is reasonable, to a totality wherein consciousness embraces the world, leaves nothing outside of itself, and thus becomes absolute thought" (Levinas 1985: 75). Universal and impersonal, this totality is also inhuman. Levinas contrasts totality with infinity, an open-ended relation based in the necessarily incomplete relation with the other. "If one could possess, grasp and know the other, it would not be other" (1989: 51): the possession, grasping, and knowing that characterize the subject of totality are impossible to the self of infinity, who instead must face the circumscription of selfish freedom by the opposing freedom of alterity. In the vector's endless permutations and substitutions, we come face to face with an other whose freedom resists total knowledge. Its radical otherness and the infinity of interpretations and negotiations it entails embody the impossible object of desire. For Levinas, "what is at stake is society. Here the relation connects not terms that complete one another and consequently are reciprocally lacking to one another, but terms that suffice to themselves. This relation is Desire" (1969: 103).

Signifying, then, is no longer Lacan's endlessly thwarted pursuit of completion down the endless chains of signifiers, but a richness of infinite variety in the paradigmatic twists and turns of the vector and the parallel rolls and tumbles of the self that enters into dialogue with it. The cyborg mode of the cinematic other, whether mechanical as in Cohl's practice or inscribed as computer algorithms in digital vector graphics, opens a society of image and spectator where desire is the mutual attraction of autonomous selves rather than the subject's narcissistic pursuit of lost dominance over its object.

This social relation of desire as dialogue has implications for the theory of representation. Seen from the standpoint of graphical cinema, representation is never essential. As Lev Manovich argues, "Born from animation, cinema pushed animation to its boundary, only to become one particular case of animation in the end" (Manovich 1997: 180). At some point in the near future when historians recognize that the photomechanical cinema is a brief interlude in the history of the animated image, representation will become, like narrative, a subcode of interpretation rather than an essence of motion pictures. In a discussion of visual perception, Jacques Aumont observes that a two-dimensional projection of a three-dimensional space "may be projected as an infinite number of potential objects" (Aumont 1997a: 24), whereas "an infinite number of possible objects could produce this [flat] configuration" (ibid.: 33). He points out that on empiricist accounts of perception, accumulated experience leads to the "correct" identification of the object. Empiricism, however, is grounded in the belief in objects. The vector principle of desire as dialogue between autonomous selves reanimates the paradoxical infinity of relations between two- and three-dimensional experience as a process of interpretation and variation. Refusing the totality of the predestined serial image in favor of the infinity of the images' movements, it finds onscreen the self's own signifying, its inner speech, as process of desire, reaching out toward, interpreting, performing elaborate *pas-de-deux* with the uncapturable transformations of a world that presents itself as signifying other, not transcendental sign.

We are now in a position to summarize the findings of the first section.

PIXEL	CUT	VECTOR
The iteration of time	The objection of space	The production of meaning
Firstness	Secondness	Thirdness
Sensation	Perception/representation	Communication

Event	Object	Sign
Preindividual	Individual	Social
Indifference (Zero)	Unity/multiplicity	Infinity
Real	Imaginary	Symbolic
Timelessness	Destiny	Hope
Referent	Signified	Signifier

One reason for beginning in the pioneer period is to isolate the elementary aspects of cinema at the moment of becoming. The task of the following chapters is to historicize them: to show how these raw principles develop and interact in the ongoing dialogue between cinema and society, to see how the virtual cinema became actual. The vector completes the elements of the moving image, but it does so by becoming human. In the normative cinemas that followed, the apparatus would take its revenge.