

TELEVISION AND COMMON KNOWLEDGE

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Place, scale and culture in a media age

Edited by

Nick Couldry and Anna McCarthy

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KINETIC SCREENS

Epistemologies of movement at the interface

Lisa Parks

In a recent essay, entitled 'Transporting the Subject', Caren Kaplan suggests that 'The value placed on mobility in representations of subjectivity in cyberspace or new technologies is not new ... but can be seen to be the full articulation of something old: travel' (Kaplan 2002: 35–6).¹ Rather than consider web navigation as a form of travel, I am interested in exploring how it is that we have come to imagine or know ourselves to be moving – whether navigating or surfing – while sitting (or with the advent of wireless, while walking, driving, riding, flying) at an interface.² I use the term 'epistemologies of movement' to suggest that there are different ways of signifying and interpreting (or seeing and knowing) movement at a web interface. I do not mean to suggest that all web-users experience movement in the same way; rather, I want to develop a way to understand the meanings of online navigation in more material and semiotic terms. Each of the interfaces I discuss structures opportunities to supplement the somewhat amorphous term 'cyberspace' with a consideration of 'the place of the interface', which I delineate in this chapter through discussion of data visualization, web art, translation portals and documentary photography. By considering the place of the interface, I hope to complicate critical and popular discourses that promulgate fantasies of digital nomadism as unfettered flow or networking, bodily transcendence, or instant connectivity, and expose the prevailing tendency to understand web navigation as yet another example of the 'annihilation of time/space'.³

This 'annihilation of time/space' discourse emerged over the past several decades, underpinned by the work of such scholars as Marshall McLuhan, Stephen Kern, Harold Innis and Joshua Meyrowitz, all of whom offered (sometimes technologically determinist) accounts of the cultural changes wrought by communications technologies in the nineteenth and twentieth centuries.⁴ While this work provided crucial observations about changes in the social, economic and political order, it tended to sidestep the fact that time/space shifts have been experienced unevenly and in different ways in different parts of the world. As a result, its assimilation into the mainstream has spawned widespread acceptance of the idea that new technologies of communication inevitably generate a placeless globalism and enable individuals to move

through time/space much faster and more extensively. What is troubling is the extent to which such ideas have gone unquestioned in the context of digitization. That the annihilation of time/space discourse holds powerful sway in the computer age is evident in the very selection of the term 'navigator' to describe the web-user or in the celebratory naming of the World Wide Web as an 'Information Superhighway'.

What is perhaps most unfortunate about the idle embrace of the 'annihilation of time/space discourse' is that it has deferred research into how the meanings, knowledges and experiences of time/space and movement have themselves shifted with different technologies, geographies, users and socio-historical conditions. Instead, the annihilation of time/space logic has served a fantasy of digital nomadism that imagines the web navigator is able to move freely, change identities at will, and travel the world without restriction. Such a fantasy is also an extension of what I have called the fantasy of global presence that emerged with the first live international satellite television broadcasts in the 1960s.⁵ Both negate the material specificities and limits of network infrastructures in order to privilege and centralize a transcendent Western subject that is imagined as existing above and beyond technology rather than in relation to it.

In this chapter, I attempt to complicate such logic by discussing movement in relation to specific web interfaces and by demonstrating how epistemologies of movement are derived through a combination of geographic, artistic, linguistic and photographic systems of signification. First, I consider how we can understand the place of the interface with a traceroute application called VisualRoute and a web mapping art project called *I:1*. While these interfaces target different users they articulate movement with technological literacy rather than transparency, exposing aspects of the web infrastructure that are often buried beneath the veneer of 'cool' design. Second, I explore how machine translation interfaces organize epistemologies of movement based on the recognition of linguistic differences. While there is a tendency for translation interfaces to structure linguistic traps by making English the lingua franca, projects such as the Translation Map emphasize crucial relations between movement, language and difference. Finally, I discuss an interface that documents a terminal form of movement – the global distribution of obsolete computers. Focusing on the Basel Action Network's images of e-waste processing centers in Guiyu, China, I argue that we need a multivalent model for understanding movement at the interface that considers the mobility of Chinese computer salvage workers in relation to the web navigators who may access such images on the BAN website. Each of these sites of analysis is offered to make discussion of web navigation more material, to complicate discourses of digital nomadism, and to encourage technological literacy, aesthetic experimentation, processes of differentiation, and exposure of global inequalities at the interface.

The place of the interface

While scholars have begun to analyze the spatial conditions of computer use whether in the home, the office or in transit, few have considered the ways in which users make sense of their own navigational process. That is, few have studied the visual signifiers or mechanisms that enable web-users to imagine themselves as 'navigating' while sitting at an interface. When most computer users 'navigate' the World Wide Web, they have little understanding of the infrastructure through which they are connected and are able to 'move' to different parts of the world. This is in part because so few websites actually visualize or display the infrastructure, which Manuel Castells calls the 'technical geography', through which the user's data move (Castells 2001). The visualization of the user's movement through the World Wide Web, his/her process of navigation, is effaced at the interface. What we see, instead, is the economic mobility of digital corporations such as Microsoft and Netscape whose browsers feature animated logos which signal the movement of data from servers to the monitor and reinforce the corporation's status as data portal, carrier or delivery system. In some cases, windows pop open either indicating a buffering process is taking place (when streaming media) or there is a connectivity problem, but otherwise we expect data to 'move' seamlessly and speedily from one place to another on the web. The issue in which I am interested here, however, is the idea that web-users are encouraged to imagine themselves as 'navigating', and yet most users have little or no understanding of the material conditions and infrastructure through which such navigation occurs. What is at stake here are issues of technological literacy. By effacing the infrastructure through which data moves, web interfaces tend to keep users naive about the apparatus that organizes and facilitates online navigation and how its processes occur in time and extend across space.

This leads me to VisualRoute.com, which is a traceroute application designed as a diagnostic device for network administrators who need to locate connectivity problems and server slowdowns on the web.⁶ VisualRoute provides a display of the trajectory through which data 'moves' when a user navigates from one point to another on the World Wide Web. In addition, it specifies the number of hops (jumps from one Internet Protocol [IP] address to another), IP addresses, node names, city locations, time zones and network ownership. It also indicates the round-trip travel time. For instance, Figure 2.1 demonstrates that a trajectory from Santa Barbara, California to Lusaka, Zambia occurs in 656 milliseconds, takes 18 hops, traverses nodes in San Diego, Atlanta, Middletown, NJ, and Lusaka, Zambia through networks owned by Cox Communication, AT&T, UUNET Technologies, and ZamNet Communication Systems.

By presenting a near real-time visualization of the user's path from his/her computer to a specific IP, along with a listing of all of the nodes and geographic locations through which the data moves, VisualRoute helps to define the place of the web interface. VisualRoute's website addresses network administrators

explaining that the utility will allow them to ask: 'why can't I get there from here?', but I would suggest that such an application should be optionally displayed on all websites: for in displaying the user's path the interface conveys knowledge about the technical geography of the World Wide Web, enabling the user to understand navigation or online movement in terms of hops, round-trip duration, network ownership and location.

Since most interfaces are designed for either maximum efficiency or an aesthetic that Alan Liu calls 'information cool', they tend not to circulate technical knowledge about their own operation, and thus as they circulate data they perpetuate 'knowledge gaps' between experts and amateurs and information rich and poor communities (Liu, forthcoming). In so doing, they also negate an understanding of the situatedness or place-based discourses of web use. The fact that such traceroute data is readily available but is not well known implies it would almost be too horrifying to see one's own online trajectories because it might involve a recognition of the self as data moving at unrecognizably high speeds. Such a perspective issues an interesting challenge to theories of media spectatorship predicated upon identificatory processes involving photographic realism and anthropomorphic representation.

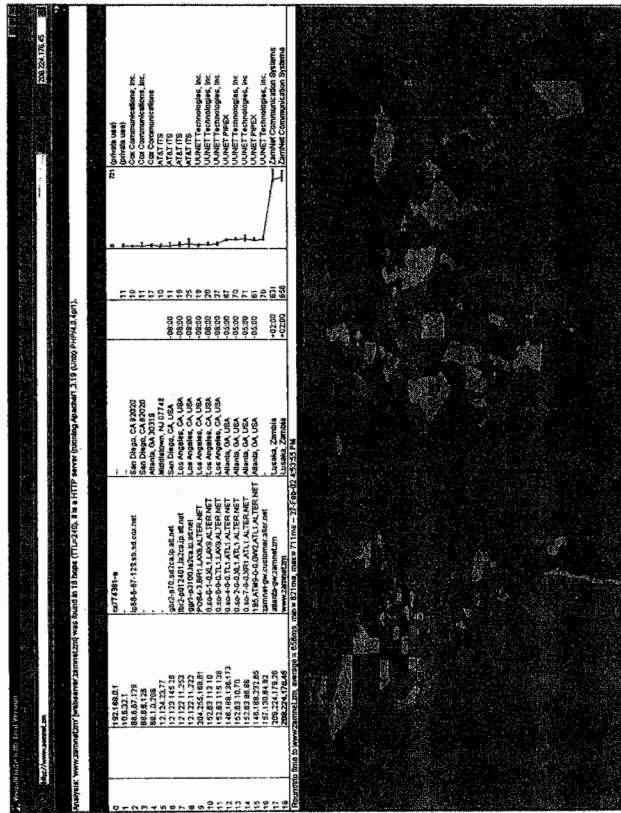


Figure 2.1 The VisualRoute interface demonstrating a graphical traceroute from a server in Santa Barbara to one in Zambia (VisualRoute is a product of Visualware Inc.). Source: Visualware Inc.

VisualRoute's maps are especially useful since, as of yet, there is no realistic mode of visual representation for online movement. (There is, of course, the sound of the modem, and there have been attempts in action and science fiction films [such as *Swordfish*, *The Net* and *Enemy of the State*] to represent online movement with digital effects that reveal wormhole-like structures.) The perspective of online movement defies realist conventions and can only really be described in Paul Virilio's terms – that is, as an 'aesthetic of disappearance', a 'logistics of perception' or a 'kinematic optics' – terms that engage questions of speed, vision and telecommunication (see Virilio 1986; 1991; 1997a; 1997b). Using traceroute applications, however, may be one way to foreground online distribution routes and speeds that are often kept invisible, and to encourage users to better understand the specificities of the time/space or place of the interface. By visualizing the user's online movement, the traceroute display also implies the need to conceptualize how an individual might identify with or imagine becoming data or a trajectory. These displays seem to concretize what Virilio calls the 'trajectory' – a space between the subjective and objective, a 'being of movement from here to there, from one to the other' (Virilio 1997a: 24). VisualRoute maps the trajectory by setting categories of web duration and extension such as the 'hop' and the 'network' against the backdrop of conventional global cartography, inviting the user to recognize him/herself as a being of movement, or 'trajectory', rather than an anthropomorphic body.

Trajectory movement at the interface can be understood as a set of highly specified paths or routes as opposed to a practice of navigation that is presumed to occur at all times, through all spaces, at the will of any user. This notion of the trajectory coincides with the work of time geographers such as Torsten Hägerstrand, Nigel Thrift and Don Parkes who, beginning in the 1970s, attempted to map the everyday trajectories and itineraries of individuals differently placed within stratified socio-economic systems.⁷ In effect, their work gave the spatial field of geography a temporal dimension. Time geographers used their diagrams to foreground the constraints placed on different individuals who moved through the same socio-economic system within a given duration. Both time geography and VisualRoute map individuals' movements through large infrastructures, whether socio-economic systems or digital networks, but since time geographers are structuralists they emphasize the fact that these infrastructures are themselves constituted by and reproduced through such movements. As Torsten Hägerstrand states, 'people are not paths, but they cannot avoid drawing them in time-space'.⁸ What is interesting is how Hägerstrand's comment changes in the context of digitization as interfaces such as VisualRoute now provide a way of conceiving of people as paths drawn in the time-space of the web, especially since users can be directed through any number of routes to get to the same web address.

The work of Swedish digital artist Lisa Jevbratt presents another way to conceptualize the place of the interface. Several of her projects attempt to map the web, but I will discuss one in particular, *1:1*, which was developed in phases

In addition to generating this database, Jevbratt designed a series of interfaces that would enable users to navigate this slice of the web contained in the database (that is, all the IP addresses gathered by her crawler). Jevbratt's five interfaces, entitled 'Migration', 'Hierarchical', 'Every Access', 'Random' and 'Excursion', not only function as web browsers, but also as visual analyses or pictorial interpretations of the web, since they composite and compare data gathered by the crawler in 1999 and 2001. The Migration interface, for instance, is made of blotches of bright red and green pixels set against a white background that correspond with IP addresses gathered in 1999 and 2001 respectively (see Figure 2.2). The interface looks like a homage to abstract expressionism, but Jevbratt calls it a 'landscape painting', insisting that database visualizations such as this can 'generate a new topography of the web'. By clicking where there is a blotch of color, the user can try to access a website, discovering that some of the websites function, that some have moved, and that others require passwords for access. Most significant is the way the interface illustrates that *the web itself moved* during this two-year period: some blotches of green and red overlap, suggesting those IPs remain the same while others spread into different areas. Jevbratt's *I:1* encourages the user to recognize the web itself as a highly dynamic and constantly moving infrastructure, and to see and imagine his/her practices of navigation as part of a massive network architecture that is material and changing.

Another of the *I:1* interfaces, Every Access, represents all of the websites found in 1999 and 2001 by the crawler. Each pixel in the interface frame is color-coded and corresponds with a website. If the crawler received access the color is green; if it could not access the site it is red; and those sites where the crawler was redirected are blue. By clicking anywhere in this colorful frame of green, red and blue densities, the user will encounter an accessible, inaccessible or redirected website. While Migration illustrates the web's movement, Every Access exposes the fact that there are significant sections of bandwidth that are completely blocked off to most web-users, restricted to those with military and/or corporate passwords. In this sense, *I:1* makes clear that online navigation is not free and unfettered, but rather it involves digital barriers that result from the way the web has been apportioned to and used by certain institutions which often have a stake in prohibiting access to information.

While VisualRoute illustrates the user's trajectory and brings the technical geography of the web into bold relief, Jevbratt's *I:1* offers a series of interfaces that generate technological literacy by visualizing data about the web and allowing the user to access it in various ways. Using these five interfaces, Jevbratt explains, 'one experiences a very different Web than when navigating it with the "road maps" provided by search engines and portals. Instead of advertisements, pornography, and pictures of people's pets, this Web is an abundance of inaccessible information, undeveloped sites and cryptic messages intended for someone else.'¹¹ By visualizing only a very small portion of the web, *I:1* manages to reveal some very significant patterns about its content. For

in 1999 and 2001.⁹ The project, which has been exhibited at the Walker Art Center, the Whitney Museum, and the Transmediale Festival in Berlin, is also available online.¹⁰ Jevbratt's *I:1* attempted to create a database that would contain IP addresses to all websites. To generate the database Jevbratt programmed a webcrawler to, as she puts it, 'knock on the doors' of all potential IP addresses, which range between 0.0.0.0 and 255.255.255.255. The crawler determined whether or not a website existed at each numerical address and stored information about whether it was accessible to the public or not in the database. Because of the massive scale of the web, the crawler only reached approximately 2 per cent of the spectrum, and placed 186,000 sites in the database. Jevbratt began another search in 2001 in order to try to understand how the contours of the web had changed in two years. The webcrawler visited those same IP addresses two years later to determine whether the websites still existed or if they had moved.

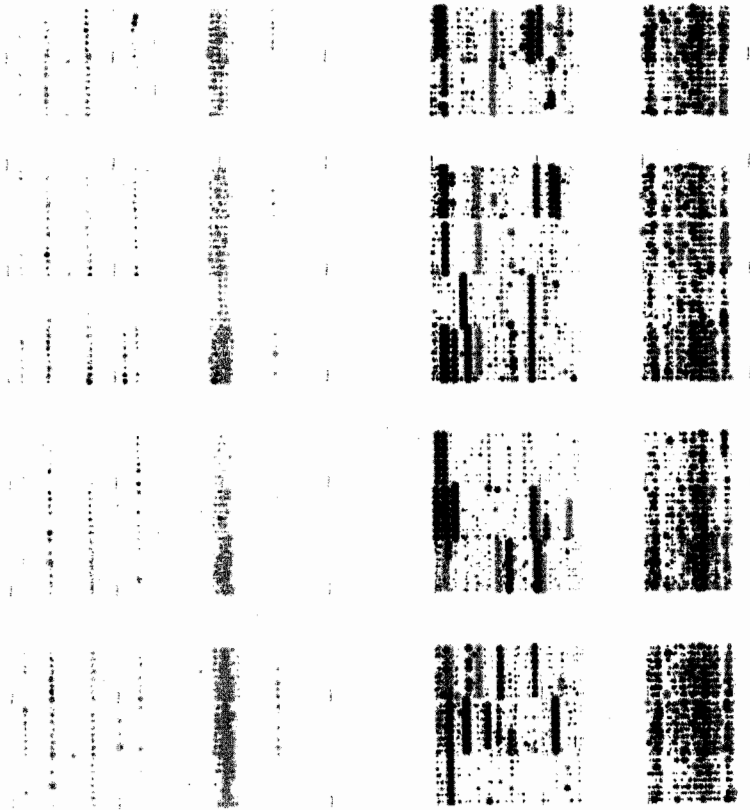


Figure 2.2 Screen capture of Jevbratt's *I:1* Migration interface.

Source: Lisa Jevbratt.

instance, many of the websites in the database are military or government sites that require special codes for access and thus remain off-limits to most users. Some websites, which are unfinished and unvisited, do not provide information so much as they take up space, causing us to rethink assumptions that web navigation is unrestricted and always informative. Finally, *1:1* demonstrates powerfully that the web is not static, but is itself a moving infrastructure. By comparing data from 1999 and 2001, Jevbratt's multiple interfaces track and illustrate macro-level changes occurring on the web that are simply too massive, dispersed and fast to perceive through a visual discourse of realism.

Both *VisualRoute* and *1:1* produce epistemologies of movement by fostering literacy about the web's infrastructure and the material practices that work to constitute it. While *VisualRoute* is a diagnostic device for network administrators trying to solve connectivity problems, *1:1* is a web art project which experiments with database formation, graphic-user interface design and web browsing. While *VisualRoute* uses conventional cartography to illustrate the user's online trajectory, *1:1* employs abstract data visualization techniques to expose the invisible architectures and concentrations of power that shape the web's topography. Both projects foreground the randomness of the web. *VisualRoute* shows that a user could traverse a different path each time he/she tried to access the same website. Project *1:1* illustrates the eclectic and unpredictable range of websites that a user could access (or be barred from) on the web. Finally, both of these interfaces attempt to render the web's totality while inscribing the singularity of the user's navigation within it.

Combined, then, *VisualRoute* and *1:1* offer unique ways of visualizing web navigation and understanding movement at the interface. What is fundamental to both is the assumption that the user should and could understand the technical geography of the web. Extending epistemologies of movement at the interface thus involves extending technological literacy and challenging the notion that such knowledge is unnecessary and uninteresting to most users. It involves recognition and discussion of the new categories and parameters of time/space rather than a presumed annihilation of them. The place of the interface can be understood as the specific path(s) through which data move at a certain rate at a certain time. This place generates the potential for a trajectory experience predicated upon a recognition or knowledge of the self as an abstraction of movement (rather than an anthropomorphic form), an array of multiple paths and uneven byways that may transfer, redirect or expire rather than fundamentally inform or transform.¹²

Translation at the interface

A further issue I would like to explore in relation to interfaces and movement is that of machine translation – the automatic translation of one language into another by a computer. One of the ways in which we infer we are moving at the web interface is by encountering foreign languages we cannot read or speak –

that is, when we hit thresholds of cultural intelligibility. Translation always involves at least a metaphoric if not a geographic leap as one language is turned into another. An online encounter with words in a foreign language may index a geographic region, but there is not necessarily a correlation between language and geography in cyberspace. Still, the material play of languages can become a way of interpreting movement at the interface. For it is ultimately through systems of signification and differentiation that movement can be understood as occurring at an interface that is perceived as still.

There is a long history of subtitling and dubbing at screen interfaces, and these forms of translation, which have driven the global film and television industries, are readily apparent and sometimes even jarring. Machine translation is designed to be much more transparent, however, so that the user simply clicks an icon and suddenly a web interface is translated into his/her native tongue (though sometimes full of mistakes). Machine translation is being widely implemented on the web and was first launched publicly at the Alta Vista portal in 1997, with the introduction of Babelfish (after the translating fish in *The Hitch Hiker's Guide to the Galaxy* by Douglas Adams). Babelfish supports translations between English and Chinese, French, German, Italian, Japanese, Korean, Portuguese and Russian, putting English at the center of the services it offers. In other words, translation exists primarily (though not exclusively) between English and a host of other languages. By 2001, Babelfish was handling 30 million translation requests per month (McKinsey 2001). Portals such as Yahoo and Google also now offer translation options, allowing the user to click a website into English or other languages that the browser supports.

The major players in the global market for machine translation are Systran (based in Paris), IBM, Lernout & Hauspie (Belgium) and the Japanese companies NEC, NTT and Fujitsu. These companies are all working to integrate machine translation into web interfaces and to power online translators. As IBM's Brian Garr remarks, 'The World Wide Web allows for the creation of global communities, but that can't happen with language barriers' (McKinsey 2001). The global community that Garr imagines is one constituted through a technologized erasure of linguistic difference, which may extend what Rita Raley refers to as 'global English'. As Raley explains, 'global English is a discursive feature of a late-capitalist episteme, and one with decidedly material effects...it has also to do with a kind of myopia that is at once linguistic, cultural, and critical. It is, in other words, what lies behind the notion that "everyone now speaks English"' (Raley 1999: 53). While 'language barriers' may be obstacles to the operations of global digital capitalism, they are crucial to the production of *difference* within and across transnational cultures. The fact that machine translation is motored by US corporations such as IBM suggests that efforts to establish a 'global community' are likely tagged to the goal of making the web a smoother place for big business, which likely hinges on global use of English. This is especially problematic, since the prediction is that there will be 560 million non-English speaking users of the web by 2003 (McKinsey 2001).

Because of this some machine translation initiatives are attempting to diffract this myopia. A project entitled Native-Languages Interpretation & Communication Environment (NICE), based at the Carnegie Mellon's Language Technologies Institute, involves machine translation of native languages, such as Mapudungun in Chile and Inupiaq in Alaska. This project sets out to 'reinstate indigenous languages in official uses outside the home' and 'prevent the disenfranchisement of speakers of indigenous languages' since the web continues to be coded in a handful of 'major' languages (such as English, Spanish and Japanese).¹³ The project allows linguistic minorities to establish online mobility since material related to education, health, agriculture and local government is translated into indigenous languages. Translation in this case facilitates the capacity for linguistic minorities to navigate the web in their own language, and in the process to have the potential to form new technological literacies and online communities. Despite such initiatives, English-reading web-users arguably have greater online mobility because their language is not only supported but it is positioned at the center of most major online translation portals. I would argue that this is ultimately a false mobility, however, since English-centric machine translation discourages English-reading web-users from learning new languages and from being able to recognize and experience *difference* at the interface. Without difference at the interface there is very little room to move. Difference shapes and reproduces both the potential for and perception of movement. If, as Rainer Schulte suggests, translation achieves a 'reorientation in the interaction with foreign cultures', then the online transparency of linguistic difference threatens to sustain an illusion in which English-reading web navigators remain convinced that they are 'moving' through the 'global community' of the World Wide Web, but may in fact be more trapped than ever in the dominance of their native tongue.¹⁴

The relationship between global mobility and language is further reinforced by various wireless machine translation prototypes that are being developed. The Tongues project, for instance, is a joint initiative between Lockheed Martin and the US Army to create a portable speech-to-speech language translator to support army chaplains in Croatia. Tongues provides real-time translation of conversation between English and Croatian. Another project, called Ling Wear, is being developed by the Interactive Systems Labs of Carnegie Mellon and the University of Karlsruhe (Germany). It is a wearable translation device designed to 'assist tourists, visitors, humanitarian and military personnel that are moving in foreign language environments'.¹⁵ These projects enable military officials and tourists to navigate geographic territories more seamlessly using real-time portable translation devices. But what does it mean exactly to *move through a foreign-language environment* if a machine instantly translates it into your native tongue?

Ian Chambers' (2002) recent work on language, history and mobility is useful here. He suggests that language should be understood as a historically situated medium that actively transforms and sets the parameters for new forms

of global transit and transition. He writes: 'The texture of language – of translation and the transit it provides and provokes – acquires an unsuspected complexity and thickness; its poetics supplement and subvert sociological and political transparency' (2002: 30). The idea of *language* as a medium is particularly relevant in an era of global digitization when the materiality of the world becomes code. If language is one of the rubrics through which we know and understand technologized movement, then what are the implications of having the capacity to translate foreign languages at web interfaces into one's native tongue? Put another way, does the user really 'move' if machine translation in effect effaces the foreign language environment and the challenge of navigation through it?

What interests me is the way that machine translation, both at desktop and wireless platforms, may alter our understandings of movement at the interface. On the one hand, it may generate a sense of linguistic liquidity, allowing users to seamlessly permeate language barriers and access forms of cultural consciousness that were previously inaccessible. And, on the other hand, it may create a linguistic trap by encouraging users to assume they can move across borders, through the world, knowing only one language. While considering such possibilities it is worth noting that most of the institutions funding machine translation projects are not driven by an impulse toward cross-cultural engagement, equitable exchange or mutual understanding. Rather, they are motivated by the twin goals of efficiency and transparency, and are primarily supporting transnational business operations, technical documentation efforts, military campaigns (especially in the former Yugoslavia, and probably now in Afghanistan) and global tourism. Some multinational corporations even describe themselves as 'geocentric' companies, which means that they try to develop products and advertising campaigns that 'transcend geographic frontiers and cultural specificities by creating messages intended to be universal from the outset' (Guidere 2001: 10). Such companies as World Lingo target business clients, indicating 'Site stickiness is double when a website is translated. Visitors stay for twice as long'.¹⁶ The company insists that translation 'makes good business sense' because 'users are four times as likely to buy if addressed in their native tongue'.¹⁷ World Lingo claims it supports the world's '10 most popular online languages', and its Instant Website Translator converts any English website into French, German, Italian, Spanish, Portuguese, Dutch, Greek, Korean, Chinese or Japanese. Like Babelfish, World Lingo not only puts English at the center of its online translation services, but the list of languages it supports, while international, reads like a relic of colonial empire.

Although machine translation may make the world more manageable for the elite – that is, corporate executives (IBM, SRI, ATT, NTT), technical experts, military officials and world travelers – it may also, in the process of selecting, combining and arranging multiple languages, teach us something about the structure and poetics of language that we ourselves have not yet recognized or understood. And if machine translation can alter what we know about language

itself, it would in turn impact the way we imagine and interpret our own mediated movements. As Chambers reminds us, translating a foreign language or culture does not leave one's own language and culture unaffected. Translation is fundamentally about being moved. Digital artists Warren Sack and Sawad Brooks grasp this clearly and are in the process of developing an interface called 'The Translation Map' that will visualize online translation processes in a spatial context. As Sack and Brooks explain, the project is motivated by the fact that 'discussion on the net is dominated by the English language', and that the web is not engaging and involving people across cultures and languages as much as it could. The Translation Map supports 'an understanding of translation as movement across and between networks and territories'.¹⁸ Rather than offer instant bilingual translations, like Babelfish or World Lingo, it will facilitate multi-lingual communication between online environments'. The software and interface will provide opportunities for users to work collaboratively online to translate a message and enable them to track it visually as it moves from addressee to addressee and from language to language. The Translation Map will generate a visualization of the translation process as it takes place in language and time, and a geographic visualization of its movement with 'an understanding that its linguistic translation will not necessarily be consistent with the boundaries of nations'.¹⁹ Sack and Brooks are using this project to emphasize language translation 'as a problem of border crossing, movement and spatialization', which they insist is 'an alternative to the technocratic idea that translation-is-decryption'.²⁰

If translation can be conceptualized as a movement between languages that involves recognition of differences, then most machine translation, by automating this process into one that occurs at an almost incomprehensible speed, re-moves the user from it. By enabling users in dispersed online environments to engage in and see translation as collaborative and situated work, The Translation Map preserves the moment of recognizing difference. As Irit Rogoff suggests, 'It is in the movement between cultures, their intertextual weavings and constant readings of one another, that the presumed experience of the other comes about' (Rogoff 2000: 49). The worst scenario, then, is if machine translation worked so seamlessly, transparently and efficiently that it erased altogether the movement between languages and their differences. The Translation Map promises to encourage 'readings of one another' so that difference is not lost. Instead, it is shared, witnessed, de-territorialized and constantly recurring. The way this project unfolds and is used will determine the extent to which web navigators are able to interpret different languages as spaces for movement rather than information barriers.

Terminality at the interface

Thus far I have considered how movement can be considered in relation to VisualRoute and 1:1, both of which provide information about the technical

geography of the web and help users understand in more material terms the layout of the infrastructure through which they 'move'. I have also suggested that online translation interfaces can activate knowledges of movement by facilitating users' recognition of different languages. While many of these services run the risk of negating difference, such projects as The Translation Map and NICE may offer ways of preserving it and extending epistemologies of movement at the interface. In each of these instances, I have tried to complicate the idea of digital nomadism with a more materialist approach to the interface, illustrating that web navigation has limited duration and routes, must fulfill requests for access codes, or prohibits communication across languages not at the center of translation services.

In this section, I suggest a final way to conceptualize movement at the interface by considering the geophysical movement of the very computer beneath one's fingertips. In other words, I discuss the global distribution of obsolete computers that once enabled users to navigate the web. Since computers are manufactured with limited lifespans – that is, as machines that have structured obsolescence – it is important to consider where they end up. One might imagine the computer as analogous to the automobile whose use value has expired and ends up in a salvage yard because it is no longer fast enough or can no longer effectively transport people from place to place. Because computers are being produced, consumed and discarded around the world at an increasingly rapid rate, they too have their own salvage yards, which I suggest serve as the metaphoric endpoints of movement at the interface.

Rather than provide statistics and charts about the global manufacturing and distribution of computers, I discuss an activist website that has exposed where the West's old computers go when they are determined no longer useful. We can learn something about the multiple meanings of movement by considering the concept of computer terminality. In *Terminal Identity*, Scott Bukatman defines terminality as a form of subjectivity that emerges in science fiction and cyberpunk discourse. He writes that: 'Terminal identity is a form of speech ... and a potentially subversive reconception of the subject that situates the human and the technological as coextensive, codependent, and mutually defining' (Bukatman 1993: 22). For Paul Virilio, terminality involves the slow erosion of citizenship. In giving up movement for stasis, the terminal citizen, he claims, 'abandons himself, for want of something better, to the capabilities of captors, sensors and other remote control scanners', and loses the power to move through and intervene in the world (Virilio 1997a: 20). While Bukatman and Virilio use the concept of terminality to explore how time spent (or imagined) at the interface reconfigures subjectivity, I use it to refer to the endpoint of the computer's use value, which, in this context, involves its movement or relocation from post-industrial to developing countries where it is disaggregated into parts and recycled into raw materials.

The Basel Action Network (BAN) is an international activist consortium that investigates hazardous waste conditions worldwide. It emerged in 1992

after adoption of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and one of the organization's most recent and high profile projects has been the investigation of the e-waste crisis in Asia.²¹ Referred to as the 'dirty little secret of the high tech revolution', e-waste involves the exportation of obsolete computers and electronics from information rich countries to developing countries in Asia.²² Communities in China, India and Pakistan have become processing centers where computers, television sets and other electronic machines are disassembled, separated and melted into raw materials. In the process, a huge number of workers are regularly exposed to toxic elements such as lead, beryllium, mercury and cadmium, which are released into the earth and water supplies of these communities. The BAN web interface is a way of accessing the political economy of the web in visual and geographic terms as it brings the material relations between computers, bodies, movements and territories into bold relief.

In December 2001, representatives of BAN and Greenpeace China visited Guiyu, in China, to investigate the conditions of workers in the region's e-waste industry. They generated a preliminary report, 'Exporting Harm: The High-tech Trashing of Asia', took photographs, collected soil and water samples, and made a video based on the investigation. Some of this material is available on BAN's website. The report establishes the environmental devastation, legal complexities and political economy of e-waste, as well as the culpability of the United States. Of particular interest here is a series of photographs on the website that dramatically illustrate the concept of computer terminality. Consider one, for instance, entitled 'E-scrapers', which shows seven workers kneeling beneath a tall pile of casings for computers and other electronics (see Figure 2.3). The caption explains that '100,000 such migrant workers labor in Guiyu, breaking down imported computers in hundreds of small operations like this one in a four-village area surrounding the Lianjiang River.' As the workers sift through the ruins for reusable parts, their bodies half buried, another scrap heap as tall as the building next-door hovers above them, looking as if at any moment it could tumble. The landscape of their labor has become that of the computer undone. Another image, called 'Wire-burning village sorting' (see Figure 2.4), shows workers picking through tough wires torn out of old computers. The caption reads: 'The wires are sorted by day and burned by night in this village. The families live right in the burn-yards.' Here wire from the West's obsolete computers becomes the earth's ground floor, and again, as machines are disassembled, it is impossible to separate the village topography from the computer's insides. The workers not only sit in mounds of wire, they are surrounded by the invisible polycyclic aromatic hydrocarbons and dioxins generated from burning it, giving a more fatal spin to the digital euphemism of 'being wired'. Finally, an image entitled 'Child on Garbage' (see Figure 2.5) shows a small boy, about 3 years old, sitting atop a scrap heap from which long blades of green grass emerge. His blackened feet are a result of the traces of toner cartridges and powder strewn about. The caption reads: 'Migrant child from Hunan province sits atop one of

the countless piles of un-recyclable computer waste imported from around the world.' The boy looks into the camera and the image asks the navigator to see this mound of electronic ruins as his playground.²³

These image interfaces illustrate how the West's computer waste shapes the landscapes and lifeworlds of Chinese migrant workers. They lend new meaning to Allucquere Rosanne Stone's insistence that the virtual age 'happens not in some theoretical space' but to one's 'own flesh and blood' (Stone 1995: 21). Village space in Guiyu is organized and defined according to the materials that are separated, such as plastics, casings, toner cartridges, circuit boards and wire. Most of this material originates from North America but some of it is from Japan, Australia, South Korea and Europe. What is perhaps most powerful about the online circulation of these images is that they compel the navigator to imagine the obsolescence and endpoint of every computer with which he/she accesses this site, and thus to recognize the computer's terminality. Put another way, the interface positions the user subjunctively by indexing computer obsolescence and staging its disaggregation within the representational frame, forcing the user to confront the fatality of the computer and the interface, both of which are socially constructed as taking us *anywhere in the world but the end*. These interfaces map out a set of dynamic relations involving technology, labor,



Figure 2.3 A typical e-scraping dismantling operation. Some 100,000 such migrant workers labor in Guiyu, breaking down imported computers in hundreds of small operations like this one in a four-village area surrounding the Lianjiang River, Guiyu, China. December 2001.

Source: Basel Action Network.

history and territory that prompts the user to confront questions about finality and death that are usually off-limits or irrelevant in cyberspace. They become the metaphoric endpoints of a seemingly endless and speedy digital network, confronting us with the debris accumulation, inertia and toxicity that make up the arduous underbelly of the World Wide Web.

It is impossible to contemplate movement at the interface, then, in isolation from the lives of workers, whose bodies are fused among the computer's disassembled parts. In the global digital economy not all workplaces are filled with new flat-screen monitors, ergonomic chairs and color laser printers. As these images illustrate, some are filled with cracked-open computers, separated scraps and scorched earth. Their place of work has become the inside of the machine – the part that is kept off-limits, locked up, closed off in Western consumer societies. These interfaces also serve as powerful metaphors for the unequal and exploitative relations between information rich and poor economies in the world. They dramatize the way extraction is rearticulated in a post-industrial economy as the commodification of obsolescence itself, as the West's old



Figure 2.4 Women picking through wires torn out of computers. The wires are sorted by day and burned by night in this village. The families live right in the burn-yards. Cancer causing polycyclic aromatic hydrocarbons and dioxins will result from burning wires made from PVC and brominated flame-retardants. Guiyu, China, December 2001.

Source: Basel Action Network.

computers are shipped across the Pacific and trucked to Chinese processing centers for recycling and a modicum of revenue. Instead of displaying the user's visual route or performing a translation, these images demand a conceptualization of the differential and hierarchical movements that occur through, and constitute, the interface in the first place.

What I am suggesting is that we need complex and multivalent models for understanding movement at the interface. How might we extend the discussion of movement at the interface to account for the distribution practices that generate toxic working conditions in Guiyu? How do the trajectories of web-users differ from those of workers who move from village to village to disassemble electronics? What is the difference between navigating Guiyu online and migrating there in the flesh? Is there a way to understand the interface as both a figurative gateway and a material object that is built and broken apart? Understanding movement at the interface involves acknowledging that we live in a world in which some people navigate the web for information while others navigate the inside of the computer for subsistence. Since most computer hardware is manufactured and assembled in such countries as Taiwan, China, Thailand, Korea, Singapore, Malaysia and the Philippines, these images also serve as a reminder that the computer itself, as a material object, has a life-cycle as a geographic movement that begins and ends in Asian developing countries.²⁴

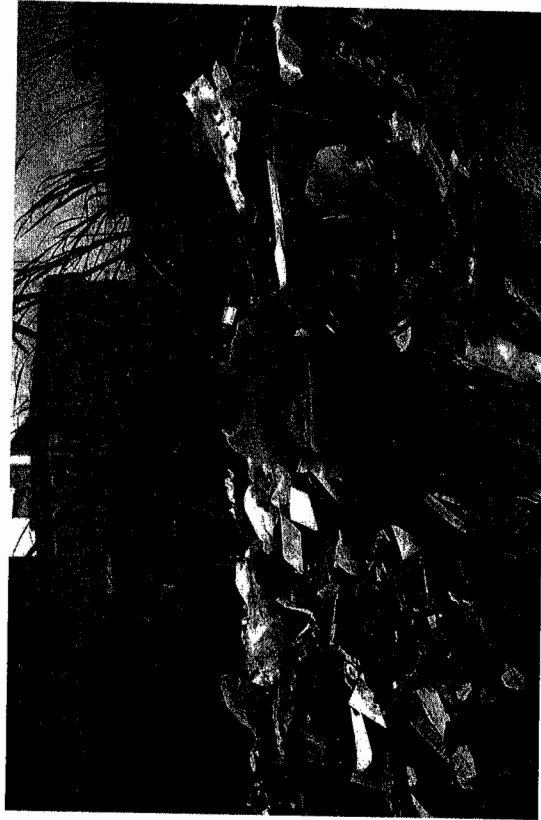


Figure 2.5 Migrant child from Human province sits atop one of the countless piles of un-recyclable computer waste imported from around the world. Guiyu, China, December 2001.

Source: Basel Action Network.

Like the traceroute map with which I began this chapter, these interfaces generate ways of understanding movement at the interface in more place-based terms. Irit Rogoff argues that we must turn to such images, and visual culture more generally, to better understand contemporary global conditions, because geography, she claims, is an epistemology in crisis. Its conventional cartographies are no longer adequate for representing the complexities of post-industrial and post-colonial conditions in the world (Rogoff 2001: Introduction). The BAN interface serves as a 'geography' in a very material way, telling us about the place-based conditions and movements of bodies and computers in China. Like VisualRoute trajectories, BAN's images expose the speed of the computer, especially processes of their production and consumption, as well as the specific locales or nodes in Guiyu that are traversed and linked. While VisualRoute encourages the user to recognize him/herself as an array of paths, the BAN interface daringly invites the user to see him/herself as part of the computer terminality that has resulted from more than a decade of global web navigation and computer use.²⁵

Conclusion

This chapter has drawn on and combined material from software developers, digital artists, corporate translators and environmental activists in an effort to suggest the need for different epistemologies of movement at the interface. The goal of my larger project is to develop a model of media analysis that will explore (a) geophysical movements; (b) phenomenological motions; (c) political (im)migrations; and (d) socio-economic mobilities in relation to one another. To construct such a model, I am imagining the media interface as a 'kinetic screen' – as an aestheticized frame and technologized time/space constituted by and through various types and combinations of movements, motions, migrations and mobilities.

I have attempted here to sketch out some preliminary ways of conceptualizing movement at the interface across disciplinary borders and in relation to specific semiotic and material conditions articulated through and beyond the screen. Considering the interface in this way involves understanding the global distribution of computer hardware in relation to the global navigation structured by its software. It involves recognizing that languages and their translation underpin *difference* in the world, and that difference sustains movement epistemologies. Finally, it involves complicating the navigator metaphor with other complex positionings, such as the trajectory, which encourages the exposure of the web's transparent infrastructures and transitional devices as the user maneuvers through it.

Notes

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- 1 Travel and mobility have become important tropes in recent cultural and social theory. See, for instance, Clifford (1992), pp. 96–116; Kaplan (1996); Urry (2000); Massumi (2002); and Morley (2000).
- 2 Cinema scholars have been interested in these questions for quite some time. See, for example, Kirby (1997); Friedberg (1994); and Deleuze (1986).
- 3 For a more detailed understanding of the discourse of digital nomadism, see Makimoto and Manners (1997). They explore how digital technologies make work-life more nomadic. Some cyberfeminist work exemplifies this fantasy of digital nomadism by assuming transformations in the gendered subject during online excursions without discussing the specific material or semiotic conditions that may either facilitate or prohibit such transformations.
- 4 For work that helped to structure this 'annihilation of time and space' discourse see McLuhan and Lapham (1994, reprinted edn); McLuhan and Powers (1992) (reprinted edn); Kern (1986); Innis (1991) (reprinted edn); Shivelbusch (1987); Meyrowitz (1986).
- 5 The impulse for transparency in digital navigation reinforces a Western fantasy of 'global presence' that emerges with the first live international television shows in the 1950s and 1960s. See my essays 'Our World, Satellite Televisuality and the Fantasy of Global Presence' (in Parks and Kumar 2002); 'As the Earth Spins: NBC's *Wide World* and Early Live Global Television' (in Parks 2001a: 332–49); and 'Satellite and Cyber Visualities: Analyzing the Digital Earth Project' (in Mirzoeff 2003).
- 6 VisualRoute website, available at: <http://www.visualware.com/visualroute/index.html>
- 7 For discussions of time-geography see Hägerstrand (1970) 'Space, Time and Human Conditions' (in Karlqvist 1975). See also Pred (1977), pp. 207–21; Parkes and Thrift (1975), pp. 651–70; May and Thrift (2001).
- 8 Cited in Rose (1993), p. 30.
- 9 Lisa Jevbratt's digital art project *1:1* was exhibited in New Langton Arts Bay Area Award Show, San Francisco (1999); Transmediale, Berlin, Germany (2000); Art Entertainment Network, Walker Art Center, Minneapolis (2000); The Altoids Curiously Strong Collection (2000); Obsession, Rosenberg Gallery, Towson, Maryland (2000); The Whitney Museum Artport Biennial 2002, New York.
- 10 To access the *1:1* interfaces go to: http://cadre.sjsu.edu/jevbratt/c5/onetoonetone/2/index_ng.html
- 11 See Lisa Jevbratt's description of *1:1* available at: http://cadre.sjsu.edu/jevbratt/c5/onetoonetone/2/index_ng.html
- 12 For a discussion of the trajectory and GPS interfaces see Parks (2001b), pp. 209–22. An expanded version has been translated into German for the *Geography and the Politics of Mobility* art exhibition and catalogue, Generali Foundation Gallery, Vienna, Austria, 2003.
- 13 See the Native Languages Interpretation & Communication Environment (NICE) Project website at: http://www-2.cs.cmu.edu/~sfarce/NICE/NICE_Intro.html
- 14 Rainer Schulte continues, 'It is the constant flow from the one to the other that heightens our awareness of otherness and activates a mental alertness to the fact that no two cultures perceive the same phenomenon in the same way – as no two people see the same thing in the same situation' (Schulte 1999: 44).
- 15 Ling Wear website, available at: www.is.cs.cmu.edu/lmie/lingwear.html

- 16 World Lingo website, available at: http://www.worldlingo.com/products_services/website_translation.html
- 17 *Ibid.*
- 18 Walter Sacks and Brooks Sawad, The Translation Map website, available at: <http://www.cs.unm.edu/~sawad/walker/proposal/test5.html>
- 19 *Ibid.*
- 20 *Ibid.*
- 21 The Basel Action Network website provides information about hazardous waste conditions and issues in different parts of the world. For a history of the organization go to: <http://www.ban.org>
- 22 See the report 'Exporting Harm: The High-Tech Trashing of Asia' at www.ban.org.
- 23 Collectively, these interfaces also function as an important counterpoint to the global digital utopias constructed in the advertising campaigns of multinational conglomerates such as ATT, Microsoft and Worldcom. Many of these ads celebrate global mobility, showing people around the world using new digital technologies or navigating the web with great ease. For a critique of these ads, see Nakamura (2000).
- 24 I thank Anna McCarthy for helping me to make this point.
- 25 BAN reports that the life span of the computer recently reduced from four to five years, to two years, even though many of the machines remain functional. This means that the computer waste is multiplying at an unprecedented rate. See 'Exporting Harm: The High-Tech Trashing of Asia', available at www.ban.org.

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