@ Cyberspace: Metaphors and Cybertrespass

By

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Abstract

References to the internet as physical space are pervasive: *go forward*, *go back, domain* name, email *address*, *enter*, *pass*word, web*site, portal*, *home*page, log*in*, log*out*, log*on*, log*off*, My*space*, *information superhighway*…. On the internet we *surf* from *website* to *website*, each with its own *address*. Sometimes we take *shortcuts* and *links*, and sometimes *sites* are blocked-off by *firewalls* so we can only *enter* through a *web portal* using a *password*.

Why do we use spatial terms to refer to the internet? Why do we call the internet cyber*space?* What are the consequences of this metaphor?

These spatial concepts are metaphors, but they are also models: some of the features of physical space correspond to and match the features of cyberspace. We experience these features of physical space while we are online. Even though we remain physically stationary, sitting at a computer and pressing buttons *feels* more like driving a car than it feels like using an appliance like a microwave or typewriter. This thesis discusses the similarities and differences between physical space and cyberspace, the relationships between them, and the social and legal consequences.

Dedication

I dedicate this work to my parents.

Acknowledgements

I thank my friends within the program for their unfailing encouragement.

I thank my sisters for their patience and understanding

I thank my parents for their support.

I thank my dad for his help.

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Introduction

References to the Internet as physical space are pervasive: *go forward*, *go back, domain* name, email *address*, *enter*, *pass*word, web*site, portal*, *home*page, log*in*, log*out*, log*on*, log*off*, My*space*, *information superhighway*.... On the Internet we *surf* from *website* to *website*, each with its own *address*. Sometimes we take *shortcuts* and *links*, and sometimes *sites* are blocked-off by *firewalls* so we can only *enter* through a *web portal* using a *password*. Spatial metaphors are "the most common way of thinking, talking, and writing about computer networks".[1]

John Perry Barlow, for example, made extensive use of spatial metaphors in his "Declaration of Independence of Cyberspace":[2]

> Governments of the Industrial World, you weary giants of flesh and steel, I come from Cyberspace, the new home of Mind. On behalf of the future, I ask you of the past to leave us alone. You are not welcome among us. You have no sovereignty where we gather.
>
> [...]
>
> ...Cyberspace does not lie within your borders. Do not think that you can build it, as though it were a public construction project. You cannot. It is an act of nature and it grows itself through our collective actions.
>
> [...]
>
> Cyberspace consists of transactions, relationships, and thought itself, arrayed like a standing wave in the web of our communications. Ours is a world that is both everywhere and nowhere, but it is not where bodies live.

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[1] Paul Adams, "Network Topologies and Virtual Place," *Annals of the Association of American Geographers* 88(1) (1998): 88.
[2] John Perry Barlow, "A Declaration of Independence of Cyberspace," February 9, 1996. Accessed November 15, 2013. https://homes.eff.org/~barlow/Declaration-Final.html.

[…]

> Your legal concepts of property, expression, identity, movement, and context do not apply to us. They are all based on matter, and there is no matter here.
>
> Our identities have no bodies, so, unlike you, we cannot obtain order by physical coercion….
>
> […]
>
> …We must declare our virtual selves immune to your sovereignty, even as we continue to consent to your rule over our bodies. We will spread ourselves across the Planet so that no one can arrest our thoughts.

Barlow speaks of cyberspace as if it were another physical region. He says:

- "I come from Cyberspace, the new home of Mind."
- We are building "a global social space".
- "We did not invite you…. Cyberspace does not lie within your borders."
- "Ours is a world that is both everywhere and nowhere…."
- "You are trying to [erect] guard posts at the frontiers of Cyberspace."

Spatial references to the Internet are prevalent and descriptive, but why do we use spatial terms to refer to the Internet? Why do we call the Internet cyber*space?* What are the consequences of this metaphor?

Certainly some dismiss these metaphors[3] as gimmicks,[4] or "playing with words,"[5] "unhelpful"[6] substitutes for a proper label, or even "duplicitous."[7] I agree that these spatial concepts are metaphors, but they are also models: some of the features of physical space

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[3] Mark Graham, "Geography/Internet: ethereal alternate dimensions of cyberspace or grounded augmented realities?" *The Geographical Journal* 179 (2013): 177. See also Jonathan G.S. Koppell, "No "There" There: Why Cyberspace Isn't Anyplace," *The Atlantic* (2000): 16.
[4] Koppell, "No 'There,'" 17.
[5] Colin Renfrew, *Prehistory: The Making of the Human Mind (New York: The Modern Library, 2009),* 100.
[6] Graham, "Geography/Internet,"177.
[7] Graham, "Geography/Internet,"180.

correspond to and match the features of cyberspace. We experience these features of physical space while we are online. Even though we remain physically stationary, sitting at a computer and pressing buttons *feels* more like driving a car than it feels like using an appliance like a microwave or typewriter. This thesis discusses the similarities and differences between physical space and cyberspace, the relationships between them, and the social and legal consequences.

Let me introduce some key terms. By 'physical space' I mean the space through which we walk, drive, and move in the directions north, south, east, west, up, and down. Physical space contains what we might call the *physical Internet*. This is the material structure of computers, monitors, modems, servers, wires, electrical outlets, etc., which underpins and is necessary to create the Internet. A power outage or malfunction here can disrupt our use of the Internet. The physical Internet is usually considered to be the interconnected network of computers, servers, modems, satellites, wires, outlets, radio waves, and so on.[8] It is hardware. When someone is *online*, they are engaging or using this physical network. The physical Internet's network nodes and links are based in the physical world and are therefore organized spatially, but this layout of technology is not what we mean by *cyberspace*.

There is no single accepted definition for *cyberspace*,[9] but at its most basic, it is the experience of being online, using the physical Internet. It is the "*sense of space* generated within the mind as we interact with [and through] computer technology," [italics added][10] and it contextualizes behavior and symbolic transactions.[11] It is the "environment"[12] facilitated by the physical Internet. In Barlow's words, "cyberspace consists of transactions [and] relationships".

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[8] Lance Strate, "The Varieties of Cyberspace: Problems in Definition and Delimitation," *Western Journal of Communication,* 63(3) (1999): 385.
[9] David Bell, *An Introduction to Cybercultures* (New York: Routledge, 2001), 7.
[10] Strate, "Varieties," 386.
[11] Strate, "Varieties," 386. See also Patricia M. Boelcher, "How Spatial Is Hyperspace? Interacting with Hypertext Documents: Cognitive Processes and Concepts," *CyberPsychology & Behavior* 4(1) (2001): 24.
[12] Boelcher, "Hyperspace," 23 and Daniel Downes, *Interactive Realism: The Poetics of Cyberspace,* (Montreal: McGill University Press, 2005), xiii.

It is meaningless to try to reconcile the geographical organization of the Internet's hardware with points in cyberspace.[13] Two pieces of data may be held on one server but are not located close together online. For example, two people in the same room can access servers that are geographically distant, and those servers may take them to vastly different websites. Furthermore, information within a single website may be held across many different servers or may be accessible by different satellites. Barlow says cyberspace is "everywhere and nowhere but it is not where bodies live." Simply, "what is near in physical space is often far apart in cyberspace and vice versa."[14]

The physical Internet and cyberspace are not one and the same thing. A map of the physical Internet – its wires, servers, and the rest – is not a map of cyberspace. Your computer may connect you to a server in Miami, then Bangkok, and then Rome, but you were not in those places in either physical space or cyberspace. A path in cyberspace need not bear any relationship to a path across computer networks, servers, or satellites.

"Cyberspace" is clearly a metaphor. In Chapter 1 I present the theory of metaphor that I will use throughout the thesis. It is based on a theory of models developed by Heinrich Hertz and on Ludwig Wittgenstein's Picture Theory. According to this theory, a system may model another system when they share corresponding features and when the relationships between the features of one match the relationships between the features of the other.

In Chapter 2 I argue that the spatial metaphors we use to describe our experiences of the Internet are models—they recognize a form that physical space and cyberspace have in common. I discuss some key features of physical space and find correspondents in cyberspace: I find that they share the concepts of *positions* and *paths*. They both also have *length, directedness, boundaries* and *portals,* and *inside* and *outside*. I also discuss the differences between physical space and cyberspace. There are certainly ways to conceive of and imagine space that through a

[13] Adams, "Topologies," 93.
[14] Adams, "Topologies," 93.

spatial model, such as those discussed Henri Lefebre, Kevin Lynch and others.[15] However, as I will be directing my argument towards legal conceptions of cyberspace that are frequently grounded in a spatial model, I will be exploring only this particular model.

In his "Declaration of Independence of Cyberspace" Barlow said, "Your legal concepts of property, expression, identity, movement, and context do not apply to us. They are all based on matter, and there is no matter here." In Chapter 3, however, I argue that the similarities between physical space and cyberspace, and the spatial metaphors that describe them, are so strong that we behave the same way on the Internet as we do in physical space. I propose that we apply *territoriality* to cyberspace—not only does being online feel like moving through in physical space, but it feels like we are moving through public and private space.

As I will show in Chapter 3, the American legal courts have applied legal models of physical space and property to cyberspace and have developed an area of common law called *cybertrespass*. As a result, the rules used to manage our behavior in physical space, now also manage our behavior in cyberspace. Recently, the Canadian Supreme court followed suit, applying spatial and territorial models to the Internet and treating cyberspace as though it was a distinct region of physical space.

[15] See for example Henri Lefebre's *The Production of Space* and Kevin Lynch's *What Time Is This Place.*

Chapter 1: Models and Metaphors

We use spatial language to describe the Internet.[16] It is sometimes said that cyberspace is *just a metaphor*. I agree that it is a metaphor, but I disagree with the word *just*. These metaphors are models that compare features of the Internet with some of the features of physical space, and I will argue, because we find similarities between them, the spatial language depicts them both. This chapter presents a theory of metaphors and models that I will use in advancing my argument. It is based on the theory of scientific models formulated by Heinrich Hertz and on theories of language formulated by Gottlob Frege and Ludwig Wittgenstein. To explain these theories, I will first refer to Karl von Frisch's discovery of "Bee Language".

Bee Language

In his Nobel lecture in 1973, "Decoding the Language of the Bee," [17] laureate Karl von Frisch reflected on the ethological research that earned him his award. Von Frisch won his Nobel Prize for discovering that honeybees 'talk' about the world around them. Specifically, he discovered the signs that bees use to communicate to one another the distance, direction, and nutritional value of food.[18]

While conducting certain experiments with bees, von Frisch put out a kind of syrup as food for them. To prevent the bees from swarming the feeding table, von Frisch removed the food and instituted feeding breaks. During these breaks, a scout bee might venture to the table, but finding the food gone, would fly away. No more bees visited. However, once the food was put out again and a scout had discovered it and returned to the hive, it was only a few minutes before an entire foraging party came back to the food site. Von Frisch wondered if the scout bee might have "reported her findings to the hive."[19]

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[16] Adams, "Topologies," 88.
[17] Karl Von Frisch, "Decoding the Language of the Bee," (paper presented at the Nobel Prize Lecture, Stockholm, Sweden, December 21, 1973).
[18] Karl Von Frisch, *Bees: Their Vision, Chemical Senses, and Language, Revised Edition,* (Ithaca: Cornell Paperbacks, 1972).
[19] Von Frisch, "Decoding," 76.

He developed a new set of experiments at the hive, and asked, "How do scouts behave in the colony upon successfully finding a food source?" Von Frisch and his research team placed a small honeybee colony in a glass observation hive, identifying and marking individual forager bees. A food station was placed nearby. The researchers noticed something remarkable once a bee visited the station and brought food back to the colony:

> Even before the returning bees turned over the contents of their honey sack to the other bees, they ran over the comb in close circles, alternately to the right and the left. This round dance caused the numbered bees behind them to undertake a new excursion to the feeding place.[20]

The researchers interpreted this dance as a signal that a scout bee had found food. But how could the others find the same station? A bee's typical range encompasses about a 5 kilometer (or 3 mile) radius from its hive, a huge territory for a bee to cover. Could the dance be saying something more specific?

Von Frisch soon noticed something else in the bees' dance: their body language varied slightly from food source to food source. The sweeter and richer the food source, the more energetic was the honeybee's dance: the bee would shake her tail at a higher frequency. If the food was scarce or offered at a weaker concentration, however, the bee shook her tail at a slower pace until finally winding down to a stop. This sign in the bee's body language corresponded to the food's nutritional quality and quantity.[21]

Von Frisch waited twenty more years before resuming experiments on the topic, but he would go on to discover how the bees represent distance. The ethologists placed a feeding station 12 meters away from the hive and a second one 300 meters away to see if there were any differences in the bees' dances. They soon found that the foragers who went to one station had a totally different dance from those who went to the other. The foragers who found food at the

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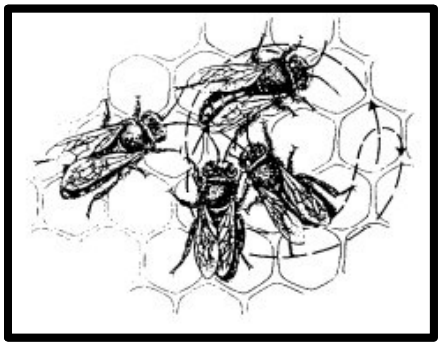
[20] Von Frisch, "Decoding," 76.
[21] Von Frisch, "Decoding," 77.

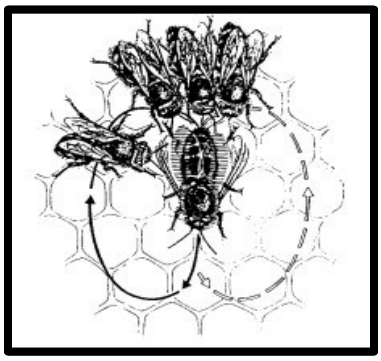
closer location performed a "round dance."[22] This dance resembles a small 'ring-around-the-rosie' or square-dance, with the bee moving in a wide circle then changing direction to dance in the opposite direction, retracing its steps once it returned to the beginning mark.

Figure 1a *Honeybee Round Dance*[23]



If the foragers had visited the food station farther away however, they did what von Frisch and his team described as a "tail-wagging dance": the forager danced in a squat or wide figure-eight shape. They danced in a long oval, and then upon reaching the beginning point, they made a similar path, but now in the opposite direction, completing another oval.[24]

Figure 1b *Honeybee Tail-Wagging Dance*[25]



After gradually bringing the two stations closer together, von Frisch discovered that each dance converted to the other when the food was about 50 meters away from the hive. Von Frisch discovered that upon returning to the colony, a bee who dances a round dance signals to her

[22] Von Frisch, "Decoding," 78.
[23] Von Frisch, "Decoding," 78.
[24] Von Frisch, "Decoding," 78.
[25] Von Frisch, "Decoding," 78.

fellow foragers that food is within 50 meters of the hive; a bee who dances a tail-wagging dance, on the other hand, signals to foragers that the food is farther than 50 meters away.

Bees do not use a measuring tape or ruler when flying from one point to another. In its dance, a bee relates the distance from its hive to food as it is affected by environmental factors, calculating wind direction, wind strength, and elevation changes into their communications.[26] If there is a strong headwind pushing against the bee, it dances as though the food is farther away. What one bee tells the others is roughly how much effort it takes to go from the hive to the food.[27]

These discoveries alone are remarkable, but von Frisch's favorite element of bee language was the representation of direction.[28] He and his colleagues noticed that while the feeding place remained constant, the bees would change their dance little by little over time. Specifically, the angle at which bees oriented their dance changed at the same approximate angle and speed as the sun moving across the sky.[29]

The walls of beehives are perpendicular to the ground, and because the bees dance on these walls, their dances are also perpendicular to the ground. Von Frisch found that the central section of their dances (the intersection or the 'middle' part of the figure-eight dance, and the beginning point in the 'round' dance) deviated from the vertical at the same angle as the angle the bees flew to the food deviated from the direction to the sun.[30]

When a bee found food by travelling directly into the direction of the sun, she would orient her dance straight up and down on the vertical hive wall.

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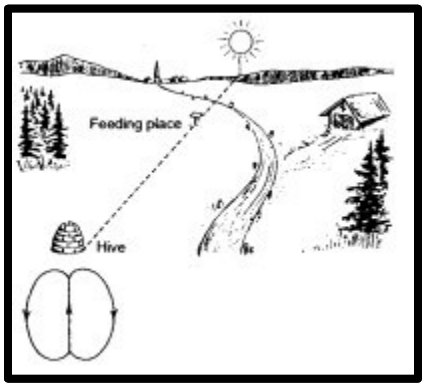
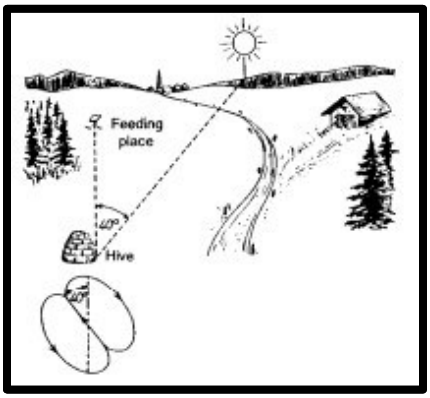
[26] Von Frisch, *Bees,* 94.
[27] Von Frisch, *Bees,* 109.
[28] Von Frisch, *Bees,* 96.
[29] Von Frisch, *Bees,* 97.
[30] Von Frisch, *Bees,* 99.

Figure 1c *Honeybee Dance Orientation: No Angle Difference*[31]



If, on the other hand, she found the food 60 degrees left of her path to the sun, she oriented her dance to a 60 degree angle left of the vertical.[32]

Figure 1d *Honeybee Dance Orientation: 60 Degree Angle Difference*[33]



Moreover, bees calculate where the food is in relation to the sun on a constant basis. Over the course of a day, the location of the sun will be different from where it was at any point earlier in the day, so bees convert the direction relative to the sun's new position and vary their messages accordingly.[34] "Those hours at the observation hive when the bees revealed their secret to me remain unforgettable," reflected von Frisch:

> The fascinating thing is that the angle between the position of the sun and the dancer's path to the goal is expressed by the dance in the darkness of the hive, on the vertical

[31] Von Frisch, "Decoding," 79.
[32] Von Frisch, "Decoding," 79.
[33] Von Frisch, "Decoding," 79.
[34] Von Frisch, *Bees,* 86.

> surface of the comb, as an angular deflection from the vertical. The bee then transposes the angle to a different area of sense perception.[35]

The location and quality of the food sources vary over time so there are many possible combinations of the distances, directions, and quality of food to describe. The honeybees have developed a language rich enough to communicate any one of those possibilities. They match any food situation with the appropriate corresponding message, and relay the current state of affairs: they *model* the location and quality of the food source in the form of a dance and pass it on to others.

Wittgenstein's Picture Theory of Language

In his *Tractatus Logico-Philosophicus*, Ludwig Wittgenstein developed a theory of language that applies well to Bee Language. His theory is sometimes called the "Picture Theory of Language". In it, sentences are compared to pictures, and both pictures and sentences are said to be "models" of reality. Some of the principal tenets of the Picture Theory are set out in the following passages from the *Tractatus Logico-Philosophicus*:

> 2.12 A picture is a model of reality....
>
> 2.13 a picture objects have the elements of the picture corresponding to them.
>
> 2.131 In a picture the elements of the picture are the representatives of objects....
>
> 2.15 The fact that the elements of a picture are related to one another in a determinate way represents that things are related to one another in the same way....
>
> 3.2 In a proposition a thought can be expressed in such a way that elements of the propositional sign correspond to the objects of the thought....
>
> 3.21 The configuration of objects in a situation corresponds to the configuration of simple signs in the propositional sign....

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[35] Von Frisch, "Decoding," 79.

> 4.01 A proposition is a picture of reality. A proposition is a model of reality as we imagine it....
>
> 4.0311 One name stands for one thing, another for another thing, and they are combined with one another. In this way the whole group—like a *tableau vivant*—presents a state of affairs....

Simply, models (including sentences and pictures) are composed of parts called "elements." Reality is composed of parts called "objects." The elements in the model depict the objects in reality, and the arrangements of elements in the models depict the arrangements of objects in reality.

Wittgenstein's Picture Theory was inspired by testimony given in a Parisian court case.[36] The court used a model of a traffic intersection to review the various possible ways that an automobile accident could have occurred. The parts of the model corresponded to the parts of the world: miniature houses, cars, and people stood for real-life houses, cars, and people.[37] The court used the model to reconstruct what could have happened in the accident.

Wittgenstein was also inspired by the work of Gottlob Frege. Frege was a logician and mathematician who created a formula language that we now call "symbolic logic" to study the logical or formal relationships between sentences.

Frege came to the philosophy of language as a mathematician trying to describe the concept of "sequence" and the concept of a "number."[38] He found that ordinary language was

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[36] Ludwig Wittgenstein, *Notebooks, 1914-1916,* trans. G.E.M. Anscombe (New York: Harper Torchbooks, 1926), 7e.

[37] Georg Heinrich von Wright, "A Biographical Sketch," in *Ludwig Wittgenstein: The Man and His Philosophy,* ed. K.T.Fann, (New York: Delta, 1967), 18.

[38] Jean Van Heijenoort, Introduction to "Begriffsschrift, a formula language, modeled upon that of arithmetic, for pure thought," in *From Frege to Godel: A Source Book in Mathematical Logic 1879-1931,* edited by Jean van Heijenoort. (Cambridge: Harvard University Press, 1971),1.

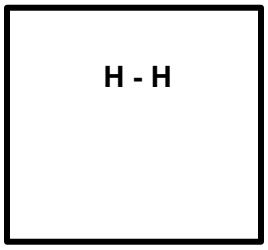
too imprecise and ambiguous to function properly for his purposes,[39] so Frege investigated other disciplines for ideas.

The sciences at that time were also outgrowing colloquial languages and explanations, and they adapted by creating new systems of representation through formula languages. Physics, geometry, mathematics, and chemistry had all developed their own systems of symbols and formulas that had their geneses from within their own respective contexts and were only meant for specific applications. Common vernacular languages were inadequate for representing the new scientific discoveries, but the formula languages the sciences developed for themselves filled the "gaps."[40]

Frege used chemistry's formulas as an example.[41] Chemical formulas are simple depictions of chemical compositions. A chemical element is a substance that consists of a single kind of atom and a chemical compound consists of two or more different kinds of atoms held together as one. In chemical formulas, every atom is represented by a capital letter (or a capital and lower-case letter) and every compound's formula is the appropriate combination of the atomic formulas and the number of the different kinds of atoms.

For example, hydrogen's chemical formula is "H." It normally occurs in molecules consisting of two atoms, so its formula is generally written as "H_2" and its molecular structure model is:

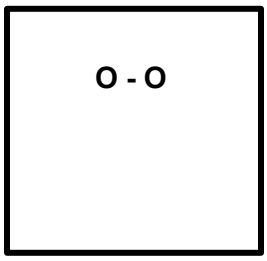
Figure 1e: *H_2*



[39] Gottlob Frege, "Begriffsschrift, a formula language, modeled upon that of arithmetic, for pure thought," in *From Frege to Godel: A Source Book in Mathematical Logic 1879-1931,* edited by Jean van Heijenoort. (Cambridge: Harvard University Press, 1971),7
[40] Frege, "Begriffsschrift," 7
[41] Frege, "Begriffsschrift," 7

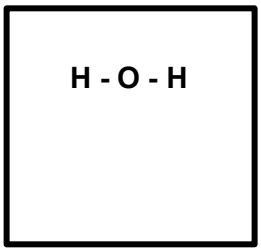
Oxygen's chemical formula is "O." It, too, normally occurs in molecules consisting of two atoms. Its formula is written as "O_2" and its molecular structure model is:

Figure 1f: *O_2*



In chemistry, water is known by its chemical name, dihydrogen monoxide. It is a chemical compound composed of two hydrogen atoms bonded to one oxygen atom, and its formula is "H_2O." Its molecular structure looks something like this:

Figure 1g: *H_2O*



Colloquially, "water" in English, "wasser" in German, "aqua" in Italian, "水" in Cantonese, and "ماء" in Arabic all refer to the same thing, but you cannot tell the chemical makeup or structure of water just by knowing these words for it. From the chemical formula for water, on the other hand, we can see that two hydrogen atoms are combined with an oxygen atom.

The formula H_2O, the diagram in Figure 1g, and the word "water" all refer to the same thing, but the formula and the diagram may be said to 'depict,' in a kind of abstract or simplified picture, water's chemical composition. The chemical elements together, two hydrogen atoms and one oxygen atom, are the pictorial elements of the model.

In Frege's symbolic language, the symbols in a sentence show its logical relations to other sentences. Just as the chemical formula for water, H_2O, shows that water is composed of (and can be decomposed into) hydrogen and oxygen, a statement in Frege's language shows what it logically follows from and what it logically leads to. In his symbolic logic, logical derivations are carried out exclusively according to the symbols used in the expressions.[42]

The *Begriffsschrift,* Frege's "ideography", published in 1879, is now commonly held to be a founding document in analytic philosophy, and is "perhaps the most important single work ever written in logic."[43] "Frege's use of symbolic logic to represent the inferential sequence of a proof inspired Wittgenstein to consider the language as simple depictions of situations.[44]

Wittgenstein's Picture Theory holds that sentences (and pictures) share a *form* with the things they depict.[45] This is "perhaps the most fundamental thesis"[46] of the Picture Theory and it is set out in the following passages of the *Tractatus*:

> 2.022 It is obvious that an imagined world, however different it may be from the real one, must have something—a *form*—in common with it…. [Italics added]
>
> 2.151 Pictorial form is the possibility that things are related to one another in the same way as the elements of the picture….
>
> 2.17 What a picture must have in common with reality, in order to be able to depict it—correctly or incorrectly—in the way that it does, is its pictorial form….

These enigmatic passages can be explained along the following lines. Let us suppose that the objects in reality consist of the sun and a cloud, and that the elements of the picture consist of a yellow patch of paint (representing the sun) and a white patch of paint (representing the cloud). The white patch can be above, below, to the left, or to the right of the yellow patch. Those possibilities are the '*form*' of the picture. They depict the relative positions of the sun and the

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[42] Van Heijenoort, Introduction to "Begriffsschrift", 1.
[43] Van Heijenoort, Introduction to "Begriffsschrift", 1.
[44] Ray Monk, *Ludwig Wittgenstein: The Duty if Genius* (London: Vintage, 1991), 45.
[45] Supra p.6-7
[46] Bertrand Russell, Introduction to *Tractatus Logico-Philosophicus,* by Ludwig Wittgenstein (London: Routledge & Kegan Paul, 1961), x

cloud in reality. In order to depict that reality, rightly or wrongly, the picture must share its form with reality.

I believe that Wittgenstein adopted his concept of form from Heinrich Hertz. Hertz was a German theoretical physicist best known for his studies of light, electromagnetic waves, and for giving his name to a scientific unit for frequency for cycles per second, the hertz (Hz). Before his premature death at the age of 36, Hertz was working on a text presenting the laws of mechanical physics, *The Principles of Mechanics Presented in a New Form.* This was published posthumously in 1894. Wittgenstein began his academic career as a physics student and encountered Hertz's work in school.[47]

Scholars cite Hertz's preface to *The Principles of Mechanics in a New Form*[48] as having a particularly profound effect on Wittgenstein,[49] and Wittgenstein appears to have adopted the idea of form from Hertz's theory of models. In the preface to the *Principles of Mechanics* Hertz states:

> The most direct, and in a sense the most important, problem which our conscious knowledge of nature should enable us to solve is *the anticipation of future events*.... In endeavoring thus to draw inferences as to the future from the past, we always adopt the following process. *We form for ourselves images or symbols of external objects; and the form which we give them is such that the necessary consequents of the images in thought are always the images of the necessary consequents in nature of the things pictured.* In order that this requirement may be satisfied, *there must be a certain conformity between nature and our thought*.... When from our accumulated previous experience we have once succeeded in deducing image of the desired nature, we can then in a short time

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[47] Wittgenstein, *Notebooks,* 36e.
[48] Heinrich Hertz, *The Principles of Mechanics Presented in a New Form* (New York: Dover Publications, Inc., 1956).
[49] Brian McGuinness, *Wittgenstein A Life: Young Ludwig (1889-1921)* (London: Penguin Books, 1988), 39.

> develop by means of them, as by means of models, the consequences which in the external world only arise in a comparatively long time, or as the result of our own interposition. We are thus enabled to be in advance of the facts, and to decide as to present affairs in accordance with the insight so obtained. The images which we here speak of are our conceptions of things. [Emphasis added][50]

In this passage, Hertz says that the "form" that we give our pictures is such that the (temporal) consequents of the pictures correspond to the (temporal) consequents of the things pictured. In order for this to occur, Hertz says, there must be a "certain conformity" between nature and our pictures. This is essentially Wittgenstein's theory of pictorial form. For Wittgenstein, the (logical) consequences of the picture correspond to the (logical) consequences of reality.[51]

Wittgenstein coined the term "logical space" to refer to the range of possible facts and to the range of pictures and propositions that can depict them:

> 1.13 The facts in logical space are the world.
>
> 2.11 The picture presents the facts in logical space, the existence and non-existence of atomic facts.
>
> 2.202 The picture represents a possible state of affairs in logical space.
>
> 3.4 A proposition determines a place in logical space. The existence of this logical place is guaranteed by the mere existence of the constituents--by the existence of the proposition with a sense.
>
> 3.411 In geometry and logic alike a place is a possibility: something can exist in it.

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[50] Hertz, *The Principles of Mechanics*, 1.

[51] Ludwig Wittgenstein, *Tractatus Logico-Philosophicus, trans.* D.F.Pears and B.F.McGuinness (London: Routledge & Kegan Paul (London, 1961), 4.125: "The existence of an internal relation between possible situations expresses itself in language by means of an internal relation between the propositions representing them."

For Wittgenstein it was essential that a proposition or model be composed of "parts" or "constituents". A "part" of a proposition or model can be varied so as to create another sentence or model situation. The number of parts of the proposition or model is the number of "dimensions" it has:

> 3.4 A proposition determines a place in logical space. The existence of this logical place is guaranteed by the mere existence of the constituents—by the existence of the proposition with a sense.
>
> 3.41 The propositional sign with logical *co-ordinates*—that is the logical place. [Italics added]
>
> 4.032 It is only in so far as a proposition is logically segmented that it a picture of a situation. (Even the proposition, *Ambulo*, is composite: for its stem with a different ending yields a different sense, and so does its ending with a different stem.)
>
> 4.04 In a proposition there must be exactly as many distinguishable parts as in the situation that it represents. The two must possess the same logical (mathematical) *multiplicity*. (Compare Hertz's *Mechanics* on dynamical models.) [Italics added]
>
> 5.475 All that is required is that we should construct a system of signs with a particular number of dimensions – with a particular mathematical multiplicity.

In these passages, Wittgenstein talks about "dimension", "coordinates" and "multiplicity." For Wittgenstein, a "dimension" or "coordinate" is a feature that varies. Colour, temperature, distance, pitch of sound, and weight are all examples of dimensions. As it varies, a dimension takes different values—for example, *red* is a value that the dimension *colour* can take, and *0 degrees Celsius* is the value the dimension *temperature* can take.

Wittgenstein used the Latin proposition *ambulo* ("I walk") to explain the concept of dimension in language. There are two parts to *ambulo*. "Ambul-" is the *stem*, a predicate that means *walk*, and "-o" is an *ending* that means that "I" am the one walking. The stem can vary from "ambul-" to "am-" or to "err," to form "amo" and "erro" which mean "I love" and "I

wander," respectively. The ending can vary from "-o" to "-as", "-at", etc. to form "ambulas," "ambulat", etc., which mean "you walk" and "he walks", respectively.[52] The proposition *ambulo* is one position in a larger linguistic space that includes *amo*, *erro*, *ambulas*, *ambulat*, etc. Since the proposition *ambulo* has two parts that can each vary, it has two dimensions.

I believe that what Wittgenstein called "dimension" and "coordinate" is what Hertz earlier called a "coordinate"[53] when referring to dynamical models. In *The Principles of Mechanics* Hertz said:

> A material system is said to be a dynamical model of a second system when the connections of the first can be expressed by such coordinates as to satisfy the following conditions:-
>
> That the number of coordinates of the first system is equal to the number of the second....
>
> Any two of the coordinates so related to one another in the two systems are called corresponding coordinates. Corresponding positions, displacements, etc. are those positions, displacements, etc., in the two systems which involve similar values of the corresponding coordinates and their change.[54] [Italics added]

Hertz says that the "number of coordinates" of a model must match the number of coordinates of the system it models. This is what Wittgenstein says in 5.475: "all that is required is that we should construct a system of signs with a particular number of dimensions – with a particular mathematical multiplicity".

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[52] In *The Tractatus*, Wittgenstein does not explain what he means by "part", but it appears to be a feature that changes from one sentence to another, so in effect Wittgenstein had a substitution or opposition theory of words. See Ferdinand de Saussure, *Course in General Linguistics*, p. 107.
[53] Wittgenstein, *Tractatus,* 4.04: "in a proposition there must be exactly as many distinguishable parts as the situation that it represents. The two must possess the same logical (mathematical) multiplicity. (Compare Hertz's *Mechanics* on dynamical models.)" Italics are in the original.
[54] Hertz, *The Principles of Mechanics,* §418.

Consider how Wittgenstein's theory applies to von Frisch's Bee Language. Wittgenstein said that the "elements" of a picture or proposition represent "objects" in reality. In Bee Language, the "elements" of the dances are the types, directions, and vigor of the dances. These represent the distances, directions, and quality of food sources, respectively.

Wittgenstein said that a picture must have as many "parts" or "constituents" as the situation it represents: the number of parts is the number of "dimensions". Bee Language has three dimensions to represent the three dimensions of food sources:

1. Round dances and tail-wagging dances represent the distance of food to the hive.
2. The angle of the dance upon the hive wall represents the direction of the food to the hive.
3. The vigor with which a bee dances represents the quality of the food.

According to Wittgenstein, a proposition or picture indicates a position in "logical space". Bees' food sources can have many possible qualities, distances, and directions. On one day, the food could be rich, 30 meters away, and 90 degrees left of the sun. The next day, the food could be of poor quality, 100 meters away, and in the same direction as the sun. Each of these situations represents a position in "food space." For every possible position in food space, the bees need an appropriate dance to represent and communicate it, i.e., the number of dances must match the number of food situations to be represented and "dance space" must have the same "multiplicity" as "food space". Each possible variant of a bee's dance represents a different possible food situation, because "dance space" has the same form as "food space."

The Picture Theory as a Theory of Models and Metaphors

Wittgenstein later restricted how the Picture Theory applies to language. His *Philosophical Investigations,*[55] published posthumously in 1953, contains Wittgenstein's own

[55] Ludwig Wittgenstein, *Philosophical Investigations,* trans. G.E.M. Anscombe (New York: The Macmillan Company, 1970).

criticism of the *Tractatus,* and renounces the idea that *every* sentence is a picture of a situation. He said that the Picture Theory:

> Does describe a system of communication, only not everything that we call a language is this system…. The question arises 'is this an appropriate description or not?' The answer is: 'Yes, it is appropriate, but only for [a] narrowly circumscribed region, not for the whole of what you were claiming to describe.'[56]

In my opinion, the Picture Theory's limitation lies not in its analysis of pictures and models, but in its original application to *all* language without exception. I do not believe that the Picture Theory can be applied to all language. I do suggest, however, that it can be applied to figurative language and metaphors.[57] That which characterizes a picture, the *common form* between the picture and what is depicted, is also what characterizes a metaphor.

Even though Wittgenstein largely abandoned Picture Theory as a theory of language, he continued to use the word "picture" and continued to use what is essentially the Tractatus theory of models in his later philosophy. He used it as I have described it above, as a theory of metaphors or figurative language. In the *Philosophical Investigations*, for example, he says:

> 295: …So this is what I imagine: everyone says of himself that he knows what pain is only from his own pain…. And even if it gives no information, still, it is a *picture*…. When we look into ourselves as we do philosophy, we often get to see just such a *picture*. Virtually a *pictorial representation* of our grammar. Not facts; but as it were, illustrated turns of speech. [Italics added]
>
> 374: …The best I can propose is that we yield to the temptation to use this picture, but then investigate what the *application* of the picture looks like. [Italics in original]

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[56] Wittgenstein, *Philosophical Investigations,* 3e.
[57] See Max Black, *Models and Metaphors* (Ithaca: Cornell University Press, 1962).

> 115: A *picture* held us captive. And we couldn't get outside it, for it lay in our language, and language seemed only to repeat it to us inexorably. [Italics in original]

In sections 293 to 295 of the *Philosophical Investigations*, Wittgenstein speaks of a person's mind being "pictured" as a box to which only that person has access, and the contents of the mind being "modeled" as physical objects. That is, Wittgenstein analyzed certain metaphors and figurative language as though they were models.

Analyzing metaphors as though they were models is a natural step, given that models can often be summed up in metaphors. The wave model of light, for example, is encapsulated in the metaphor of "light waves". This metaphor is an abbreviated allusion to the extensive isomorphism between the transmission of light and the movement of water waves. Like the underlying model, this metaphor invites us to transfer our knowledge of one domain to another. Generally, like a model, an 'apt' metaphor acknowledges forms and features that two things have in common. It tells us to take the knowledge of one thing and apply it to another.

In this thesis, therefore, I will treat spatial metaphors involving the Internet as abbreviated allusions to an underlying model and isomorphism between physical space and the Internet.

Conclusion

In this chapter, I have applied Wittgenstein's theory of language in the *Tractatus* to Bee Language, have explained Wittgenstein's concept of a "dimension", and have shown that Wittgenstein's concept of "dimension" may have been adapted from Hertz's concept of "coordinate". Finally, I have introduced the concepts of "metaphor" and "model" that I will use to elucidate "cyberspace" and "cybertrespass" in the following chapters.

In the following chapters I will argue that the metaphor "cyberspace" and the spatial language we use to describe the Internet are models. They 'work' because the Internet and physical space share a form.

In Chapter 2 I will argue that physical space and cyberspace share a form that we experience in similar ways so we describe them using the same terms. I will argue that we use moving through physical space as a model for using the Internet and review what makes up that form.

In Chapter 3 I will argue that in addition to speaking of the Internet as though it were space, we also *act* as though it were space. The rules we use to manage our behavior in physical space, *territoriality* and *trespass to real property,* now also govern our behavior in cyberspace. Specifically, American courts have developed a tort of cyber-trespass to govern online transactions and for the purposes of search warrants Canadian courts have treated cyberspace as though it were a distinct region of physical space.

Chapter 2: The Metaphor of Cyberspace

Using the Internet is like moving through physical space. On the Internet we 'go forward' or 'go back' between 'websites' and each one has its own unique 'address.' Some of these 'domains' give us 'hyperlinks' or shortcuts to make our paths shorter and faster, some are 'web portals' that give us access to other sites, and some are blocked off so we must 'enter' the internal sites using a 'password.' In this Chapter I will explain why we use *moving through physical space* as a model for using the Internet: in the sense discussed in Chapter 1, physical space and cyberspace share a *form*. In this Chapter I will review what makes up that form.

I will argue that physical space and cyberspace share certain features that we experience in similar ways and so we describe them in the same way. First, both are made up of *positions*, *sites* in physical space and *websites* in cyberspace, and each position is described by its own unique name, *addresses* in physical space and *domain names* in cyberspace. Second, there are *paths* in both physical space and cyberspace – a path being an ordered sequence of positions. Third, paths *connect* every position to every other in both physical space and cyberspace. Fourth, in both physical space and cyberspace, *directedness* and *length* can be attributed to paths. Finally, and most importantly for the purposes of discussing 'cybertrespass' in chapter 3, both physical space and cyberspace can be *separated* into regions, and *access* to sites can be limited in both physical space and cyberspace.

As a result of these similarities, the first-person experience of viewing websites on a computer is more like the first-person experience of moving along a path through physical space than it is like watching television. Even though we may be sitting still in front of a screen, viewing websites feels like, and is described as, moving through physical space.

Motion through Physical Space

Most people are comfortable using spatial concepts in their daily lives and are equally comfortable applying those concepts metaphorically to the Internet. Only a tiny fraction of those

people have much knowledge of physics or mathematics. Nevertheless, in reviewing spatial concepts, I will use the explanations of two physicists, Heinrich Hertz and James Clerk Maxwell.

I use Hertz's and Maxwell's explanations because I believe they have done a good job of collecting some of the spatial concepts that we use in our daily lives and showing how they fit together. I do not claim that Hertz or Maxwell formulated a 'Theory of Space' that truly describes all the intricacies of physical space as it really is. I do not claim that the concepts discussed by Hertz and Maxwell are identical to those currently used relativistic physics, quantum mechanics or topology. I certainly do not claim that their explanations encompass the alternative conceptions of space like those propounded by Henri Lefebre, Kevin Lynch and others.[58] My thesis is not about space as viewed through a lens shaped by physics, mathematics, or Marxism; it is about spatial concepts frequently used in day-to-day navigation of the world and some metaphorical uses employed in that navigation.

For both Hertz and Maxwell, the first and most fundamental concept of physical space is the concept of *place* or *position*. They both explain *position* in terms of material bodies. At any given time, each body has a position, and we can refer to positions via the bodies located there or nearby.[59] Maxwell said:

> The arrangement of the parts of space can no more be altered than the order of the portions of time. To conceive them to move from their places is to conceive a place to move away from itself. But as there is nothing to distinguish one portion of time from another except the different events which occur in them, so *there is nothing to distinguish one part of space from another except its relation to the place of material bodies*. [Italics mine][60]

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[58] See for example Henri Lefebre's *The Production of Space* and Kevin Lynch's *What Time Is This Place*.
[59] Heinrich Hertz, *The Principles of Mechanics Presented in a New Form* (New York: Dover Publications, Inc., 1956),§ 9, and James Clerk Maxwell, *Matter and Motion,* (New York: Dover Publications, Inc., 1952), 7
[60] Maxwell, *Matter and Motion,* §18

Although we use material bodies to define positions, we must not confound[61] the properties of bodies with those of space: space and matter are not one and the same. Space is a set of positions, not the bodies that might happen to occupy those positions. Physical bodies may move, but the different positions that bodies occupy do not. Positions in space and the relations between them do not depend on a certain kind of matter, a certain amount of matter, or any material thing being found there.[62]

Because we distinguish between positions, we can give them their own names. We often refer to the specific names of positions or locations in physical space as *addresses*. To determine an address, we choose certain bodies as starting positions or landmarks from which we may describe the positions of all other bodies. These starting positions may be arbitrary, and

> We may choose any point whatever for the origin [our starting point for measurement of space and time], and there is no present reason why we should choose one point rather than another. The configuration of the system – that is to say, the position of its parts with respect to each other – remains the same, whatever the point be chosen as origin. Many inquiries, however, are simplified by a proper selection of origin.[63]

In daily life, we often pick out a body that we regard as 'immovable' to serve as our 'origin' for measurement and orientation, often a physical landmark like a mountain or a building. Other 'immovable' objects stay stationary relative to the origin. 'Movable' bodies like people, animals, and cars are not stationary relative to the 'immovables' nor to one another.

Once we have defined the origin, we can describe the position of every physical object with respect to every other. As it happens, we can describe any position in physical space with respect to any other position using three fundamental and fundamentally different directions, the three dimensions of physical space. As Hertz explained, the location of an object may "be

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[61] Maxwell, *Matter and Motion,* §16
[62] Maxwell, *Matter and Motion,* §16
[63] Maxwell, *Matter and Motion,* §15

represented analytically by means of its three rectangular coordinates referred to a set of fixed axes. These coordinates will always be denoted by x_1, x_2, x_3 [now better known as Cartesian coordinates x, y, and z]…"[64] That is, when we describe the position of a body with respect to any landmark, we use three different dimensions or measurements and describe it, for example, as a certain distance *north* or *south*, *east* or *west*, and *above* or *below* the landmark.

The terms we use to describe positions vary, and "proper" vocabulary depends upon convention. Geocentric terminology, for example, takes the physical features of the earth to be stationary and calls the dimensions "longitude," "latitude," and "altitude." In cities built on a grid, streets mark different lines of longitude and run north-south, avenues mark different lines of latitude and run east-west, and altitude or elevation starts from the ground and goes up. Here addresses describe where a given position lies by the intersection of these dimensions. The address 12A-3456 78 Street, for example, tells us that someone lives in apartment A which is 12 floors above ground (altitude), at the intersection of the 34th avenue (latitude) and the 78th street (longitude) of the city.

Instead of defining the origin in terms of 'immovable' bodies, however, we may sometimes define it egocentrically, using ourselves – that is, our own bodies – as the principal reference point. In this manner of description, we (our bodies) are always at the center of things. We describe the positions of things as being "here" with us or "there" away from us, "near to" or "far from" us, and we set the three dimensions so that the positions of objects are "ahead of," "behind," "above," "below," and to the "right" and "left" of wherever *we are*. In this way of speaking, a person's body defines his or her space.[65] The center, or wherever "here" is for that particular person, is the subjective focal point to which everything else, every other position in space, is related.

Now let us consider the *paths* of bodies moving through physical space, how an object goes from one position to another. The *motion of a body or system* is

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[64] Hertz, *The Principles of Mechanics,* §12
[65] Julie E. Cohen, "Cyberspace As/An Space," *Columbia Law Review* 107 (2007): 228

> The passage of a system of material points from an initial position to a final one, considered with reference to the time and manner of the passage.... Consequently, in any definite motion the [body or] system describes a definite *path*, and moreover it describes lengths in definite times. [Italics added][66]

A *path* is the ordered and sequential collection of positions a physical body occupies while moving from one location to another.[67] When I walk from my apartment to the grocery store, for example, I first leave my apartment through the door, I then walk out the building's front door, down the street, past the pub, past the bus stop, continue walking for two city blocks, and arrive at the grocery store. The path I take passes these landmarks in that specific order:

A) Apartment door
B) Building's front door
C) Pub
D) Bus stop
E) Grocery store's front door

Motion through Cyberspace

Corresponding to positions in physical space are *websites* on the Internet.[68] Websites are the individual "cyberplaces"[69] of cyberspace. They are what we 'visit'[70] when we are online and they are also where digital content is located.[71] The only "travellers"[72] within cyberspace are websites' *users,*[73] those people who experience websites first-hand:

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[66] Hertz, *The Principles of Mechanics,*§256
[67] Hertz, *The Principles of Mechanics,*§97
[68] Jonathan G.S. Koppell, "No "There" There: Why Cyberspace Isn't Anyplace," *The Atlantic* (2000): 16, and Guo Zhang and Elin K. Jacob, "Reconceptualizing Cyberspace: "Real" Places in Digital Space." *The International Journal of Science in Society* 3(2) (2012): 98
[69] Zhang and Jacob, "Reconceptualizing," 96
[70] Boelcher, "Hyperspace," 27, and Lance Strate, "The Varieties of Cyberspace: Problems in Definition and Delimitation," *Western Journal of Communication,* 63(3) (1999): 385, 389, 396,and Adams, "Topologies," 90
[71] Boelcher, "Hyperspace," 32
[72] Stephen Graham, "The End of Geography Or The Explosion of Place? Conceptualizing Space , Place, and Information Technology," in *The New Media And Cybercultures Anthology, ed.* Pramod K. Nayar (Oxford: Wiley-Blackwell, 2010). 91
[73] Boelcher, "Hyperspace," 25

> The events that make up an experience with computers are the basis from which a sense of space is constructed. In other words, cyberspace is a product generated by the simultaneous presence of humans and machines…. It is formed through our interface with the computer.[74]

While we are engaging with and attending to the contents of a website, we are not paying attention to the contents of the physical space around us. We are *present* at the website – the website is our *here* and *now*: "cyberspace fosters a sense of immersion within a virtual environment and *places the user in the center, not the periphery*" [75]. Whatever the website we are on at a particular moment is our "foreground", and all other websites and physical places exist in the background elsewhere.

All the individual positions collected together make up physical space, while all the websites collected together make up cyberspace: "cyberspace is not an undifferentiated whole but consists of an amalgamation of distinct and bounded place-like units [called] websites."[76]

As with positions in physical space, each website is unique and is identified by a unique name. When a person refers to a *web address*, he is usually referring to a *domain name*.[77] Domain names are our "territorial markers in cyberspace,"[78] the alphanumeric labels people use to describe the positions of websites. Domain names describe positions in cyberspace.

In cyberspace a path is the sequence of all websites that we occupy in our passage from one website to another;[79] a path consists of the websites one has visited in the particular order over a period of time.[80] For example, when I go on the Internet first thing in the morning, I start at my homepage, I go to the New York Times homepage to scan the headlines, then to the BBC

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[74] Strate, "Varieties," 389
[75] Strate, "Varieties," 397, emphasis mine.
[76] Zhang and Jacob, "Reconceptualizing," 98-99
[77] ICANN. "Beginner's Guide to Domain Names." Accessed November 20, 2013. www.icann/en/about/learning/beginners-guides/domain-names-beginners-guide-06dec10-en.pdf, 4
[78] Robert Sommer, "From Personal Space to Cyberspace," Labortatorio de Psicologia Ambiental *Serie: Textos de Psicologia Ambeintal* (01) (2001): 7
[79] Boelcher, "Hyperspace," 37, see also Adams, "Topologies," 90
[80] Adams, "Topologies," 90

homepage to do the same, then to Environment Canada to check the forecast for the day, and then I check my email. The path I take every morning passes through these websites in that specific order:

A) Personal homepage

B) New York Times homepage

C) BBC homepage

D) Environment Canada's Edmonton page

E) Email inbox

With paths comes the metaphor of "moving" through cyberspace. When you move along a path in physical space, your position changes and you see different things around you. We have that same feeling of motion and change on the Internet: we can go from website to website and what we see becomes different too.

Shared Features between Physical Space and Cyberspace

We use physical space as a model of cyberspace. This does not mean that for any position in cyberspace there is a corresponding position in physical space – it does not mean, for example, that your corner bookstore corresponds to Amazon.com. Nor does it mean that a particular path in cyberspace has corresponding to it some particular path in physical space.

Instead I suggest it means something more abstract: It means that any path whatsoever in physical space shares certain topological and geometrical features with any other path in physical space. Those general features of physical paths correspond to general features of paths in cyberspace. Travelling down a path in cyberspace feels like travelling down a path in physical space because cyberspace and physical space share these features. They constitute the *form* that cyberspace shares with physical space. The shared features of physical space and cyberspace include *directedness*, *connectivity*, *length* and *restricted access*.

Directedness

The paths in both physical space and cyberspace are 'directed'. *Directedness* means that a path can be traversed in two different directions and that the positions of a path can be visited in two different orders. When I walk from my apartment to the grocery store, for example, I first leave my apartment through the door, I then walk out the building's front door, down the street, I pass the pub, and then pass the bus stop, continue walking for two city blocks, and arrive at the grocery store. The path I take passes these landmarks in that specific order:

A) Apartment door

B) Building's front door

C) Pub

D) Bus stop

E) Grocery store's front door

Having bought my groceries, I return home on the same path, but this time I pass the landmarks in the opposite order.

FIGURE 2a: *Directedness*

From my home to the store I go: A → B → C → D → E
From the store to my home I go: A ← B ← C ← D ← E

We can thus attribute a direction to the path between my apartment and the grocery store, depending on the order in which I pass through the positions on the path. I can start at my apartment and end at the grocery store, or I can start it at the grocery store and end at my apartment.

A path in cyberspace likewise has directedness. By clicking the "Back" button or arrow, I can retrace my steps from my email inbox back to my homepage, just as I can retrace my steps when I return from the grocery store.

Connectivity

In physical space, there is no position that you cannot get to from any other: there are paths leading from any position to every other position. Paths connect all positions with one another into a *single* space. In cyberspace, too, you can go from any website to (almost) any other. Connectivity is the reason we speak of the Internet as a single entity, "*the* Internet".[81]

Note that the positions in physical space are all connected with one another and the positions in cyberspace are all connected with one another, but the positions in physical space are not connected with the positions in cyberspace or vice versa. I cannot walk from my apartment to your homepage. If I asked you to point with your finger (in physical space) to your homepage, where would you point? A website is not north, south, east, west, above, or below any location in physical space. As Barlow said, cyberspace "is not where our bodies live."[82]

As a result of the Internet's connectivity, we can choose limitless destinations in cyberspace. We can wander aimlessly *surfing the Internet*, search systematically, or move directly toward a pre-determined goal. We can explore new territory, get side-tracked, go in circles, and get lost. Or we can backtrack to familiar regions. The sensation of using the Internet is the sensation of unconstrained movement,[83] like walking in a city. We "pass among various virtual places in complex ways, not unlike a driver or pedestrian navigating through city spaces."[84] As Adams said, physical sites,

> Each segmented and contained, yet interconnected by easily accessible paths – make up the social environment in physical space that is normally studied by human geographers. The same description can be easily applied to the virtual places of the Internet.[85]

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[81] It is possible, of course, to have "Local Area Networks", where websites are connected with one another but not with websites in the broader world. Each such network is, in effect, its own space, isolated and unreachable from cyberspace.
[82] Barlow, "A Declaration."
[83] Strate, "Varieties," 389, 402
[84] Adams, "Topologies," 93
[85] Adams, "Topologies," 94

The experience of free movement to diverse destinations characterizes the Internet. Compare using the Internet to watching a movie in a theatre. In both cases, images appear sequentially before us on a screen, just as different scenes appear before us when we move along a path in space. But, in contrast with using the Internet, when we watch a movie we are like passengers on a train rolling down a single, pre-ordained path: we cannot veer off in a different direction or go backwards and retrace our steps.

Length

In physical space, we can divide a path into similar units, and count the number of units in the path to measure of the length of the path. For example, we can deem my steps to have the 'same length,' and then the length of the path is the number of steps it takes me to go from the first to the last position.[86]

In cyberspace we can measure the length of a path by counting the number "steps" we take to get from one website to another website: it is the number of different websites we pass through, by either clicking on hyperlinks, or typing a new address into the browser.[87] The number of websites we pass through roughly corresponds to the amount of time it takes us to go between different websites, just as length is a rough measure of travel time in physical space.

Restricted Access

Boundaries separate physical space into *interior* and *exterior regions*. A circle, for example, separates the points of the plane on which it is drawn into those points that are *inside* the circle and those points that are *outside*. Any path leading from an interior point to an exterior point or vice versa must cross the boundary.

We often encounter boundaries as *barriers* to movement that restrict *access* around or through physical space. For example, the walls, floor, and ceiling of my apartment are material barriers that separate the physical world into everything *inside* my apartment and everything *outside*.

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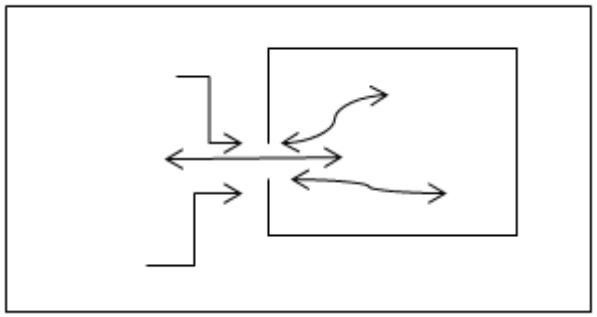
[86] Hertz, *The Principles of Mechanics,*§99
[87] Boelcher, "Hyperspace," 31, Cohen, "Cyberspace As/An Space," 229

The door to my apartment is both a barrier and a *portal*—it regulates access by keeping people out or letting them in. There is only one door to my apartment, and every time I go from the interior of my apartment to the exterior, or vice versa, I must pass through the door and across its threshold.

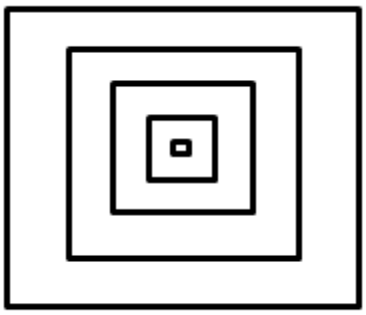
There are many examples like my door in the physical world, things like passage ways, gates, bridges, harbours, border crossings, and so on. They are all points of access that allow passage, leading through or between barriers, both separating and linking different areas. Any path that crosses through a barrier, or from an outside position to an inside position and vice versa, must pass through these points of access.

Figure 2b: *Portal*



Boundaries can separate positions into nested regions, or regions embedded within other regions. My door separates my apartment from the space that is outside it. Further, the door to my washroom separates my apartment into that space which is inside my washroom and that space which is outside. Finally, the door to my medicine cabinet separates the space in my washroom into all of the area that is inside the cabinet and all the area that is outside. The space of my medicine cabinet is nested within my bathroom, the space of my bathroom is nested within my apartment, and the space of my apartment is nested within my apartment building.

Figure 2c: *Nested Regions*



At first glance, it might appear that cyberspace has nothing corresponding to physical boundaries and regions. But cyberspace has barriers to access comparable to the walls of my apartment. Consider for example web portals, the "organized gateways that help structure the access to information found on the Internet."[88]

A web portal is a website that creates "a single point of access to information,"[89] by presenting links to and features from other websites. Internet search engines were the first web portals which soon morphed into the major Internet navigation sites like Yahoo!, Excite, AOL, and MSN.

There are now many different kinds of web portals with many different features and customizable options. As far as this thesis is concerned however, a web portal is a website that lets the user navigate cyberspace by providing links embedded within the website and that lead to other websites that can be accessed only through the portal.

A web portal can become the necessary 'in between' position or entry way into another web domain, a door from one online area to another. For example, only I can view the information of my bank account online, and to access it, I must enter the online banking website through two separate login portals. In the first one, I must identify myself using a code that only

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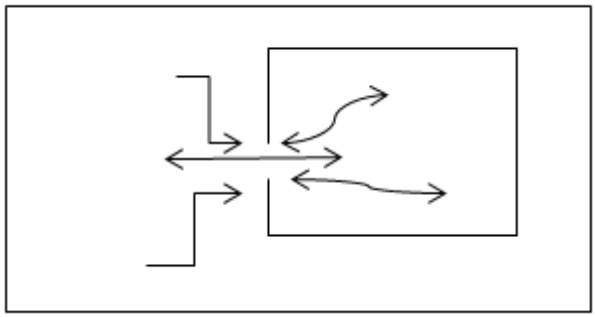
[88] wiseGEEK. "What is a Web Portal?" Accessed April 10, 2014. www.wisegeek.org/what-is-a-web-portal.htm

[89] Atlantic Web Fitters, "What is a Portal?" Accessed April 10, 2014. www.atlanticwebfitters.ca/AboutCMS/WhatisaWebPortal/tabid/95/Default.aspx

I have, and once the bank has verified that my code is correct, I am sent directly to the second login page that asks me for my secret password. If I provide the wrong code during the login sequence or I forget my password, the portal becomes a barrier and 'closes off' my account and there is no other way for me to reach it. These two websites that require me to login effectively separate all of cyberspace into everything *outside* that entrance from everything *inside*.

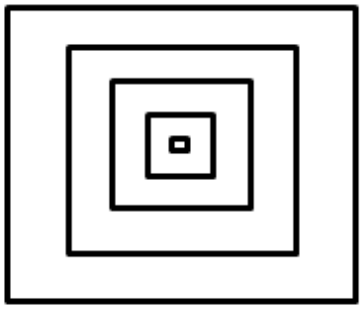
Any path into my personal account can come from almost any other website, but it must go through the first login portal.

Figure 2d: *Portal*



Further, once I have made it through, I can access a number of sites embedded within my personal account domain, whether it is the one to update my address, the one where I can transfer money from my savings account to a bill, and so on. In effect, these websites are all *nested regions* behind the "wall" of my online bank.

Figure 2e: *Nested Regions*



In this way, some regions of cyberspace are nested within other regions like some regions of physical space are nested within others:

> The sense of the border in cyberspace can be found… [in] division and demarcation…. In the virtual territories of cyberspace the border between what is inside and what is outside is marked, first of all, but the belonging, or not, to… 'access.'[90]

Differences between Physical Space and Cyberspace

We have seen that paths in physical space and cyberspace share certain features in common: *directedness*, *connectivity*, *length*, and *access*. However, there are also important differences between paths in physical space and paths in cyberspace.

The most important differences involve *continuity*. In cyberspace, we can generally 'jump' directly from one website to any other website without having to pass through a third website lying between them. I can go from my homepage directly to the BBC website, or directly to my email, or directly to (almost) any other website I want. Further, I can visit any of those sites in any order I want: [91] "links can be arranged in a number of different patterns, in which all are connected directly to all other"[92] websites; "there is no predetermined sequential organization of the underlying nodes"[93].

When we move along a path in physical space, by contrast, we can never jump directly from one position to another, without passing through a third position in between them. When I walk from my apartment to the grocery store, I must first pass the bus stop that is between them. Nor can I jump directly to the bus stop, but must pass through points intervening between

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[90] Daniele Mezzapelle and Luca Zarrilli, "Border and Cyberspace: Some Reflections of Political Geography." *Romanian Review on Political Geography* 2(2009): 138
[91] Boelcher, "Hyperspace," 27
[92] Adams, "Topologies," 90
[93] Boelcher, "Hyperspace," 27

it and my apartment. In physical space, we must always pass through these 'neighboring' positions before we reach 'more remote' positions.[94]

The fact that in cyberspace we can jump from one website directly to (almost) any other means that all of those websites are effectively the same *distance* apart in cyberspace. Each website is equally far from or near to every other one.[95]

Since proximity between websites is not intrinsic to cyberspace, some people use physical proximity to represent other things. For example, Boelcher noted that similarity of website *content*

> Can be psychologically represented as distance. [Websites] that are similar in meaning are 'closer together' in the 'information space,' [and those] that are not are 'far apart.' This, in turn, implies that semantic similarity can be described using geometric properties, just like Euclidean geometric properties define physical space.[96]

In this way of looking at things, the more similar the content of a website is to the content of another, the closer together they are: two websites are 'neighbors' if their contents are similar, and are 'remote' from one another if their contents are dissimilar. Though I do not personally find them particularly illuminating, many maps of cyberspace use this idea, grouping like sites with like (see Figures 2e and 2f).

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[94] This led Zeno of Elea to conclude in the 5th Century AD to conclude that movement was impossible.
[95] Boelcher, "Hyperspace," 31
[96] Boelcher, "Hyperspace," 31

Figure 2f[97]***:*** *Updated Map of Online Communities – 2010*

[97] XKCD. "Updated Map of Online Communities- 2010." Accessed May 14, 2014. http://xkcd.com/802

Figure 2g[98]***:*** *Map of the Internet 1.0*

Models of the Physical Internet

The components of the physical Internet (the hardware) are located in the physical world, and are therefore organized spatially. A large portion of the data carried by the physical Internet is carried via undersea cables, shown in Figure 2g below.

[98] Jay Simons, *Map of the Internet 1.0*. Map. http:www.jaysimons.deviantart.com/art/Map-of-the-Internet-1-0-427143215 (accessed January 31, 2015).

***Figure 2h*[99]:** *Submarine Cable Map*

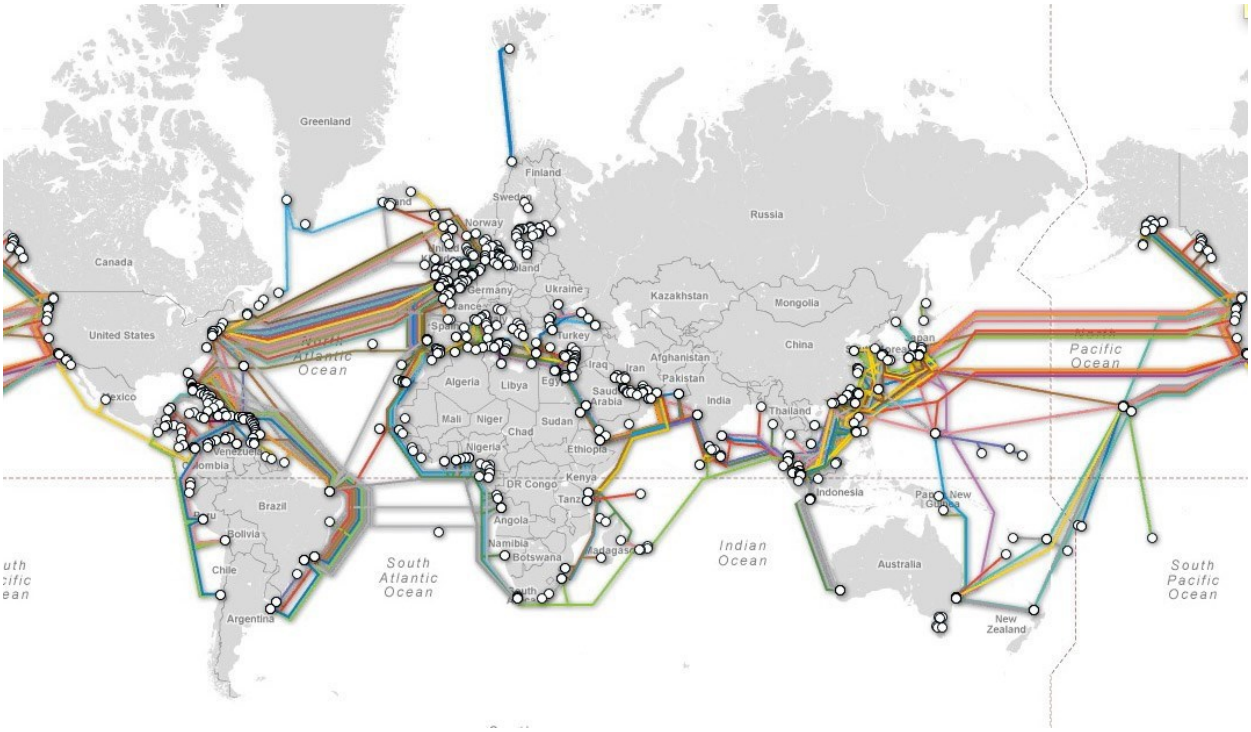

Figure 2g stands in contrast to the maps of cyberspace in Figures 2e and 2f. Note that the geographical positions in Figure 2g do not correspond in any way to the positions in Figures 2e or 2f.

The physical Internet has spawned its own metaphors. Former United States Senator Ted Stevens, for example, compared the Internet to a series of tubes:

> Ten movies streaming across that, that Internet, and what happens to your own personal Internet? I just the other day got… an Internet was sent by my staff at 10 o'clock in the morning on Friday. I got it yesterday [Tuesday]. Why? Because it got tangled up with all these things going on the Internet commercially….
>
> They want to deliver vast amounts of information over the Internet. And again, the Internet is not something that you just dump something on. It's not a big

[99] TeleGraphy. *Submarine Cable Map*. Map. PriMetrica Inc., 2014. www.submarinecablemap.com (accessed January 27, 2015).

> truck. It's a series of tubes. And if you don't understand, those tubes can be filled and if they are filled, when you put your message in, it gets in line and it's going to be delayed by anyone that puts into that tube enormous amounts of material, enormous amounts of material.[100]

Stevens' metaphor is a fairly reasonable (if simplistic) description of the physical Internet. In the physical Internet, information does move along continuous paths (cables and wires, or "tubes") from one physical position to another.

The physical Internet's links and connections are based in the physical world and are thus organized spatially, but this layout of technology is not what we mean by *cyberspace*. A map of the physical Internet is not a map of cyberspace. A path in physical space or the physical Internet does not bear any relationship to a path in cyberspace. People sometimes conflate the descriptions of the physical Internet with those of cyberspace and start mixing metaphors — we will see this at work in Chapter 3.

Conclusion

Everyone uses spatial metaphors when talking about the Internet, but I have never before seen an attempt to explain why these spatial metaphors are so common. In this chapter I have argued that we use spatial metaphors to describe the Internet because the experience of using the Internet has certain general features in common with the experience of traveling through space. These features arise from abstract properties that all paths in physical space have in common with all paths in cyberspace.

Cyberspace and physical space share a form. Both are made up of *positions* and both contain ordered sequences of positions called "paths". Paths in both physical space and cyberspace *connect* every position to every other position. *Directedness* and *length* can be attributed to paths in both physical space and cyberspace. Finally, *access* to sites can be limited

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[100] Cory Doctorow, *Sen. Stevens' Hilariously Awful Explanation of the Internet*. BoingBoing, July 2, 2006. Boingboing.net/2006/07/02/sen-stevens-hilarious.html

in both physical space and cyberspace, creating *separated* regions. These commonalities allow us to use the metaphor of space when we talk about using the Internet.

Metaphors and models are powerful cognitive tools. If we did not use spatial metaphors, it is hard to imagine how we would communicate our experiences in using the Internet to one another. Without using spatial metaphors, it would be nearly impossible to teach the uninitiated (say, someone's grandmother) how to use the Internet.

In Chapter 3, I will argue that *cybertrespass* is a reasonable extension of the concept of *trespass*, given the fact that both physical space and cyberspace have the feature of *access* upon which the concept of trespass is based.

Chapter 3: Cybertrespass

Barlow, captivated by the idea that the Internet is like a separate space, declared that the physical world's legal concepts were inapplicable to it:[101]

- "Your legal concepts of property, expression, identity, movement, and context do not apply to us. They are all based on matter, and there is no matter here."
- "We must declare our virtual selves immune to your sovereignty, even as we continue to consent to your rule over our bodies."
- "Nor do you possess any methods of enforcement we have true reason to fear."

I disagree with Barlow. In this chapter I will argue that people apply the concepts of *territoriality* and *trespass* to cyberspace, treating cyberspace as if it were physical space.

I will argue that the similarities between physical space and cyberspace are so strong that we now behave online as we do in physical space. Because we see and feel the similarities between physical space and cyberspace, we act in one as we would in the other. The correspondences between physical space and cyberspace thus extend to our social attitudes and codes of behavior. Specifically, we apply *territoriality* to our online transactions: not only does it feel like we are moving through physical space, it feels like we are moving through *public* and *private* spaces. Furthermore, an intrusion to an online space feels much like an intrusion to an offline space and is treated legally as such – the courts have developed an area of common law called *cybertrespass*. I will begin by reviewing *territoriality*.

Territoriality in Physical Space

Territoriality is that which divides public spaces from private spaces. It is the set of behaviors and ideologies that are based on perceived authority over a space;[102] it governs how we feel and act toward a space and the people within it, based on who controls and dominates the area. This control is generally based on the duration or permanence of the proprietor over

[101] Barlow, supra 2
[102] Paul A. Bell. *Environmental Psychology,* (Orlando: Harcourt, Inc., 2001),

the space, the extent and strength of his or her control, the amount of security and defense from intrusion, and finally, the amount of modification and personalization he or she has made to the space.[103]

While there are a multitude of ways to stake a claim over a given space, the most obvious method is to delineate the territory, separating it from the space nearby, first by erecting and emphasizing physical boundaries, and secondly by personalizing the area. Erecting physical boundaries limits and controls access to a territory. Dividing an area from the surrounding space signals to others that it must be treated differently. If the area is a space blocked off on all sides, the owner or proprietor signals that access is regulated and is exclusive to a select group.[104]

Even a symbolic or non-physical boundary can stake a claim over a space; a sign that says "No Trespassing" or "Access Prohibited" can be just as effective as a fence or wall: any warning that crossing into a territory is trespass suggests that the law enforces the owner's defense from intrusion. The mere delineation of a border can deter entry.

Personalizing a space creates much the same effect. Instead of asserting control from the boundaries inward, personalizing the space does it from the inside out. One claims authority over a space by making the environment reflective of oneself,[105] communicating one's values, beliefs, interests, and group memberships. Modifying the area evidences a personal connection to and investment in the space. It fosters attachment between the owner and his or her own place, again creating the impression to outsiders that it 'belongs' to someone.[106]

Asserting authority and control over an area by changing it, even if those changes are minor or cosmetic, effectively protects it from the outside as "people tend to respect properties

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[103] Jeffrey D. Fisher, et. al. *Environmental Psychology 2nd Edition*. (New York: Holt, Rinehart and Winston, 1984), 276-277
[104] Bell, *Environmental,* 282
[105] Bell, *Environmental,* 282
[106] Fisher et al, *Psychology,* 187

that can be identified as someone's territory more than properties that cannot be easily identified."[107]

Further, there are more challenges and acts of aggression targeting a space with ambiguous boundaries and ownership, while areas with well-established ownership are subject to fewer invasions.[108] Even if the border is only implied or symbolic (i.e. the border is little practical protection from a direct attack), "when spaces have clear boundaries that signal they 'belong' to somebody, there is evidence that less crime and vandalism occur."[109]

Once we have divided space into territories, we can further organize them into primary or private spaces, secondary spaces, and public spaces. Primary or private spaces are areas like a bedroom, personal desk, or home. They have a high degree of perceived ownership, use, and control by a small and exclusive number of people that is relatively permanent, which allows a high degree of personalization and investment: these territories are central to the everyday lives of the occupants.[110] In these cases, primary spaces tend to be extensively personalized so any intrusion is felt personally and taken seriously:

> By definition, primary territories are more central to the owner's life and are associated with more legitimate feelings of control than public territories… invaders are seen as more threatening and hence are dealt with more harshly.[111]

Secondary spaces are those semi-public places like classrooms, office spaces, or apartment building courtyards. These are areas open to a larger number of people and so are less closely identified with any one individual. Those who occupy this space must share with others only limited control or authority over the space at any given time,[112] so the rules about access, intrusions, and exercising control are often unclear.[113] Secondary spaces do allow for

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[107] Bell, *Environmental,* 286
[108] Fisher et al, *Psychology,* 284
[109] Bell, *Environmental,* 286
[110] John R. Gold, *An Introduction to Behavioral Geography,* (Oxford: Oxford University Press, 1980), 89
[111] Fisher et al, *Psychology,* 184
[112] Gold, *Introduction,* 89
[113] Gold, *Introduction,* 90

some personalization, but there is often some regulatory power that is responsible for managing the space.[114]

Finally, public spaces are on the opposite end of the spectrum. Territories like public parks or train stations are open and accessible to everyone. They are not typically owned by any identifiable person or group in particular, and it is difficult for anyone to assert his control over the area as everyone in the space is entitled to the same limited rights to access, personalization, and control. While some personalization and occupation of the space is possible, it is rare and usually only temporary.[115]

Territoriality in Cyberspace

Territoriality, and our demarcation and personalization of spaces in the physical world, are like what we experience online with websites when we interact with interfaces.[116] When an individual moves from website to website and spends more time in one spot than another, that area of cyberspace "belongs to the individual, it becomes personalized through our idiosyncratic arrangement of files, directories, and desktops. This area in cyberspace is therefore colonized, transformed in part into a part of our personal space."[117] Territoriality in physical space is a product of a person's relationship to a part of physical space. Territoriality in cyberspace it is a product of a person's relationship to a website or web domain.[118]

We find examples of primary, secondary, and public spaces online.[119] The most recognizable example of a primary place is a person's personal Facebook account or profile. Facebook is basically an on-line gated community, where one must join as a member with a username and password before he or she is allowed to see who else might be there. Once there,

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[114] Fisher et al, *Psychology,* 177
[115] Gold, *Introduction,* 90
[116] Lance Strate, "The Varieties of Cyberspace: Problems in Definition and Delimitation," *Western Journal of Communication,* 63(3) (1999): 392
[117] Strate, "Varieties," 402
[118] Strate, "Varieties," 404
[119] Strate, "Varieties," 405

every member has a profile page to which each may restrict access based on who is trying to view the site. One can customize this page with information and pictures of oneself, lists of one's favorite things, places one has gone, and friends or acquaintances, and one has a "wall" on which to post conversations with others.

As with primary spaces in physical space, *invasions* by 'creepers' or hackers are terribly upsetting and leave one feeling personally threatened and exposed and violated, just as if someone broke into one's home and rifled through one's physical photo albums, personal correspondence, papers and other personal effects.

An example of a secondary space online might be the message board on the University of Alberta moodle: a space that is open to a large number of people but that is still exclusive to only University of Alberta students, faculty and staff. It is a space that requires one to login with username and password to prove that the user is a student in the appropriate class moodle. The site is somewhat customizable; the user may decide to use the calendar function, post a message, or change his profile picture and update the information about himself. The site is monitored for content and security, however, and after every semester, the site changes so the student no longer has access to the classes' sites in which he had been previously enrolled.

The areas of cyberspace that are generally accessible to everyone constitute public spaces. On-line message boards or chat rooms are examples of public spaces in cyberspace. No one there has any expectation that the content of the post will be private, and anyone is entitled to submit a post.

Just as in physical space, what feels like a private space may in fact be public and vice versa. A "public" online forum is still managed by a person or group who has decided to let people in or keep them out; the owner has not given up the space or the rights to it.

Furthermore, possession and legal ownership are not always the same. My Facebook site is *mine* — no one else uses it or personalizes it — but Facebook currently claims the legal rights to it.[120]

Application of Law to the Internet

Law and Metaphor

How courts deal with any new technology depends upon the analogies they see with prior technologies: "each metaphor thus brings out and highlights certain factual similarities to the metaphorical source and downplays others and in so doing, thus modulates the nature of legal analysis."[121]

Models and metaphors are the very foundation of common law.[122] Common law is developed by applying legal precedents developed in the past to the present. A judge has to decide a case by comparing it to laws and findings from past legal cases. She looks for pre-existing models and patterns: if the judge interprets the facts of a case to be meaningfully similar to the facts of another — if they share a *form* — the two cases must be treated consistently and she must arrive at the equivalent consequence; the court "must resort more overtly to metaphor in order to see how the new concept [or situation] fits within the existing legal framework."[123]

Common law is a flexible system. It evolves as circumstances change, and over time patterns emerge.[124] Law adapts and is applied to new circumstances as new realities come up; the reasoning in one case sets a model for similar cases that follow:

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[120] Facebook does not claim the rights to all of its contents. See Facebook's Statement of Rights and Responsibilities, https://www.facebook.com/legal/terms
[121] Shyamkrishna Balganesh, "Common Law Property Metaphors On The Internet: The Real Problem With The Doctrine of Cybertrespass," *Michigan Telecommunication Technology Law Review* 12 (2006): 302
[122] Kathleen K. Olson, "Cyberspace as Place and the Limits of Metaphor." *Convergence: The International Journal of Research into New Media Technologies* 11 (2005): 11
[123] Olson, "Limits of Metaphor," 11
[124] Epstein, "Cybertrespass," 73

> If the world's first automobile loses control and plows up your garden, how do courts 'follow existing valid law' when no law whatsoever refers to automobiles? There is a law for the horse and buggy, law for public nuisance, law for trespass, and law for captive wild animals that have escaped captivity (to cut the list arbitrarily short). Which of these is the rampaging automobile most like? Is it more like a horse and buggy than a pigsty within city limits? Is it more like either of these than a trespassing vagrant whose campsite ruins the garden? Is it more like these than a marauding circus bear? The liability of the owner, driver, seller, and manufacturer of the automobile depend on which analogy we think is strongest.[125]

The Law of Trespass

Trespass is a violation of a person's rights. In applying trespass to the Internet, the courts have grappled with the distinction between the *physical Internet* and *cyberspace,* and have often confused the two. In legal terms, they have grappled with the distinction between trespass to *chattels* and trespass to *real property (land).*

Chattels are items of property that are tangible moveable objects, like furniture, livestock, clothing, jewellery and so on.[126] The components of the physical Internet fall here; computers, servers, routers, wires, computer chips, satellites, and the rest are all chattels.

Real property, on the other hand, refers to things that are fixed, permanent, and immovable; essentially, land and buildings.[127]

To sue successfully for trespass to chattels, at least in the United States,[128] one must prove harm. The law recognizes two kinds of harm to chattels:[129]

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[125] Peter Suber, "Analogy Exercises for Teaching Legal Reasoning", 17
[126] William Blackstone, *Commentaries on the Laws of England Volume 3: Of Private Wrongs,* (Chicago: University of Chicago Press, 1979).144
[127] Blackstone, *Commentaries 3,* 144
[128] The common law tort in Canada might be different. The *Canadian Encyclopedic Digest* states that "any unauthorized touching or moving of a chattel is actionable at the suit of the possessor, *even though no*

1. *Physical damage or destruction*, and
2. The *deprivation of possession* to the owner so the owner may not use the chattel for some significant period of time.

In the case of real property (in both the United States and Canada), on the other hand, the owner can sue for trespass against anyone who intrudes into his space *even if the owner has not suffered any physical damage*. Liability arises independent of any damage *at all* to the property. The mere intrusion and violation into the space creates liability. American and Canadian common law punishes the *insult* to the landowner's property rights, physical security, and emotional peace: "damage is presumed in the very act"[130] of trespass.

The American Restatement of Torts states the distinction between trespass to chattels and trespass to real property as follows:

> The interest of a possessor of a chattel in its inviolability, *unlike the similar interest of a possessor of land,* is *not* given legal protection by an action for nominal damages for harmless intermeddlings with the chattel. In order that an actor who interferes with another's chattel may be liable, his conduct must affect some other and more important interest of the possessor. Therefore, one who intentionally intermeddles with another's chattel is subject to liability only if his intermeddling is harmful to the possessor's materially valuable interests in the physical condition, quality, or value of the chattel, or if the possessor is deprived of the use of the chattel for a substantial time.[131] [Italics added]

In short, the law does not require actual damage when someone trespasses on real property but does require it when someone trespasses to a chattel.

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harm ensues" [emphasis added] see *Canadian Encyclopedic Digest (Ontario)* vol. 32, 3d ed. (Toronto: Carswell, 2003) "Trespass," §181

[129] Restatement (Second) of Torts 218 comment. e

[130] Balganesh, "Common Law Property Metaphors," 275

[131] Restatement (Second) of Torts §218, comment e (1965)

Cases Developing Cybertrespass

The distinction between the physical Internet and cyberspace (i.e. trespass to chattels and trespass to real property) was in issue in the two most iconic cases establishing the American common law of cybertrespass, *CompuServe Inc. vs. Cyber Promotions Inc.* (1997) and *EBay, Inc. v. Bidder's Edge, Inc.* (2000). Trespass to the chattels constituting the physical Internet became the conduit to apply trespass to real property to cyberspace.

The plaintiff in *CompuServe Inc. vs. Cyber Promotions Inc.*[132] was a large commercial online service and email service provider. For a fee, subscribers could access CompuServe's proprietary network and the rest of the Internet. The defendant, Cyber Promotions, was an online direct email marketing company that sent *spam* (unsolicited email advertisements) on their own behalf and on the behalf of their clients. Cyber Promotions sent hundreds of thousands of spam emails to CompuServe's customers.

When its customers complained about the undesired spam "clog[ging]"[133] up their email inboxes, CompuServe demanded that Cyber Promotions stop using CompuServe's computer system by sending unsolicited email. Cyber Promotions responded by sending even more spam. CompuServe therefore asked for and was granted an injunction in 1996 requiring Cyber Promotions to cease its trespass to chattels. The injunction was extended in 1997.

In granting an extension to an earlier injunction, Judge James L. Graham found that Cyber Promotions had trespassed to CompuServe's chattels, namely its proprietary computer networks. CompuServe had argued that the large volume of email messages occupied a large amount of storage space on its servers and was a drain on their processing power. Judge Graham found this to be the required harm to the chattels.[134]

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[132] CompuServe Inc. v. Cyber Promotions Inc, 962 F. Supp. 1051-Dist. Court, SD Ohio 1997 or 962. Supp. 1015 (S.D. Ohio 1997)
[133] James Macdonald, "Electronic Trespass in Canada: The Protection of Private Property on the Internet," *Canadian Journal of Law and Technology* (2006): 164
[134] CompuServe Inc. v. Cyber Promotions Inc. 962 F. Supp. 1015 at ...

Additionally, Cyber Promotions was found to have damaged the relationship CompuServe had with its customers. The customers found the spam an inconvenience; CompuServe charged a fee for their services, so "the process of accessing, reviewing and discarding unsolicited email"[135] burdened customers and caused them to find or threaten to find a different service provider that would stop the spam.[136]

The defendants argued that CompuServe made the business decision to connect their users to the Internet and, therefore, allow people or organizations to connect to their customers via email in return.[137] To a certain extent, the judge agreed: "certainly… there is at least a tacit invitation for anyone on the Internet to utilize plaintiff's computer equipment to send e-mail to its subscribers."[138]

Crucially, however, Judge Graham found that the argument was "analogous to the argument that because an establishment invites the public *to enter its* [*real*] property for business purposes, it cannot later restrict or *revoke access to that property*." [Italics added][139] He analyzed the intrusion not as a trespass to chattels but as a trespass to land. He said that a business invitee's privilege *to remain on the business's premises* of the said business could be revoked as soon as he received notification *to leave* by the owner or his agents.

Recall that an American court may find trespass to chattels only when the chattel has been physically damaged, or when the owner was dispossessed of it for a significant period of time. Judge Graham found that the spam damaged CompuServe's chattels, but in reality the only damage was that the emails were unwanted by recipients. If the messages had been welcome, CompuServe customers would not have complained, the emails would not have been considered a burden to the system, and there would be no damage. CompuServe's equipment

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[135] CompuServe Inc. v. Cyber Promotions Inc. 962 F. Supp. 1015 at … [136] CompuServe Inc. v. Cyber Promotions Inc. 962 F. Supp. 1015 at … [137] CompuServe Inc. v. Cyber Promotions Inc. 962 F. Supp. 1015 at … [138] CompuServe Inc. v. Cyber Promotions Inc. 962 F. Supp. 1015 at … [139] CompuServe Inc. v. Cyber Promotions Inc. 962 F. Supp. 1015 at …

was not *really* physically harmed or compromised. CompuServe proved only that the trespass was unauthorized, but not that it was damaging.

Though ostensibly applying the law of trespass to chattels, Judge Graham really granted the injunction because he found that the spam was an *unauthorized intrusion*. In doing so, he in effect applied the law of trespass to *real property*, "effectively rendering the requirements of cybertrespass analogous to those of trespass to land."[140]

The second landmark case establishing the law of cybertrespass is *EBay, Inc. v. Bidder's Edge, Inc.* (2000)[141]. EBay is a major person-to-person online auction site, where sellers and buyers can meet and agree on the terms of a sale. In the late 1990s a company called Bidder's Edge (hereafter "BE") ran a website called "AuctionWatch.com," which aggregated information from many online auction sites, including eBay. BE collected the information so its users could search multiple auctions by product type all at once instead of having to search each auction's website separately. BE did not run its own auctions; it only provided information about others' auctions online.

To collect information about auctions, BE sent out automated software query agents called "robots," "bots," "spiders," or "crawlers" to different auction websites to search for and gather information.[142] These names are all misnomers—these agents are not *physical* robots or animals with *physical* bodies, and they do not actually *travel* from website to website *taking* information *away* from its original spot or 'owner'. Indeed, the robots themselves did not *consume* eBay's resources or deprive eBay of them.

Rather, the robots are elements of software that make the same request of computer network systems that people or computers do; the requests BE's robots made were standard queries for information that were functionally indistinguishable from a human making the very same request. Simply, BE's robots queried eBay's servers and the servers answered back.

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[140] Balganesh, "Common Law Property Metaphors," 284
[141] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…
[142] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…

Additionally, the information the robots found and collected was neither confidential nor proprietary; it was made open and available to the public and because it was purely factual data, it was not covered under American copyright law.[143]

Because BE's robots made requests of eBay's networks, however, these networks used processing resources and storage resources to fulfill the request, making that capacity unavailable to the system's owner or other users.[144] If the requests were sent at a high volume, they could theoretically slow the operations of the rest of the system. The robots were not inherently dangerous or harmful. As with the CompuServe case, the only damage or harm was that the robots were unwelcome. EBay and BE entered into negotiations to license BE's use of the robots, but when the negotiations failed, eBay told BE to stop sending robots. When BE continued to use the robots, eBay asked the courts for and obtained an injunction on the basis of trespass to chattels.

BE argued that neither it nor its robots could have trespassed upon eBay's website because the website was publicly accessible.[145] Judge Ronald M. Whyte found however that eBay's servers were private property and that EBay gave only conditional access to the public.[146] On the basis of EBay's User Agreement and warnings to BE, he found that the robots represented unauthorized intrusion.

As in *CompuServe vs. Cyber Promotions,* in order for the court to find trespass to eBay's chattels, it needed to find that eBay experienced some damage or was dispossessed of its chattels. Justice Whyte found that "robots consume the processing and storage resources of a system, making that portion of the system's capacity unavailable to the system owner or other users."[147] He stated, however, that "eBay *does not* claim that this consumption has led to any physical damage to eBay's computer system, nor does eBay provide any evidence to support the

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[143] Balganesh, "Common Law Property Metaphors," 286
[144] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…
[145] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…9
[146] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…9
[147] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…1

claim that it may have lost revenues or customers based on this use…"[148] and that "eBay does not indicate that these expenses are incrementally incurred because of BE's activities, nor that any particular service disruption can be attributed to BE's activities."[149]

Nevertheless, Justice Whyte still granted the injunction because he compared BE's actions to trespass to land (though he recognized the inherent problem in doing so):

> If eBay were a brick and mortar auction house with limited seating capacity, eBay would appear to be entitled to reserve those seats for potential bidders, to refuse entrance to individuals (or robots) with no intention of bidding on any of the items, and to seek preliminary injunctive relief against non-customer trespassers eBay was physically unable to exclude. The analytic difficulty is that a wrongdoer can commit an ongoing trespass of a computer system that is more akin to the traditional notion of a trespass to real property, than the traditional notion of a trespass to chattels.[150]

In granting the injunction, Justice Whyte thus effectively ignored the requirement for harm in trespass to chattels,[151] and instead effectively applied trespass to land:

> In a sense, the court's ruling in *eBay* seems to bring down in its entirety, the conceptual divide between trespass to chattels and realty that previous courts had sought to maintain, at least nominally…. A mere *use* without any physical harm would not be actionable, unless the resource in question is realty.[152]

Search Warrants in Canada

Canadian courts have also applied spatial and territorial models to the Internet, and have treated regions of cyberspace as though they were distinct regions of physical space.

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[148] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…9
[149] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…3
[150] EBay Inc. v. Bidder's Edge Inc. 100 F. Supp. 2d 1058 at…6
[151] Balganesh, "Common Law Property Metaphors," 290
[152] Balganesh, "Common Law Property Metaphors," 288

This issue arose recently in the 2013 Supreme Court of Canada case *Regina v. Vu*.[153] Than Long Vu was charged with organizing a marijuana grow-op out of a home in British Columbia. Police obtained a warrant that authorized the search of the residence for evidence that may include "computer generated notes" but which did not specifically authorize the search of computers. They searched two computers and a cell phone found in the house and obtained evidence implicating Vu.

Vu claimed at trial that the search of his computers and cellular phone had violated his section 8 Charter rights to be free from unreasonable search and seizure. The trial judge agreed and concluded that because Vu's personal computers and cellular phone were not specifically mentioned in the warrant, police were not authorized to search them. She excluded most of the evidence found as a result of those searches. The Court of Appeal found that the warrant had indeed properly authorized the searches so the police had not breached Vu's Charter rights. Traditionally, once police obtain a warrant to search a physical place for things (like chattels), they do not require specific prior authorization to search in receptacles like cupboards, wardrobes and filing cabinets. The Court of Appeal concluded that "there is nothing in the nature of electronic devices that requires the law of search and seizure to treat them differently from other receptacles found on premises for which a search has been authorized."[154]

In 2013 the Supreme Court of Canada found that the question was whether or not Vu's cellular phone and computers were more like receptacles (chattels) or distinct regions of physical space (real property). It stated that:[155]

> The privacy interests implicated by computer searches are markedly different from those at stake in searches of receptacles such as cupboards and filing cabinets. It is difficult to imagine a more intrusive invasion of privacy than the search of a personal or home computer…

[153] R v. Vu, 2013 SCC 60, [2013] 3 S.C.R. 657
[154] R v. Vu, 2013 SCC 60, [2013] 3 S.C.R. 657
[155] R v. Vu, 2013 SCC 60, [2013] 3 S.C.R. 657

> In effect, the privacy interests at stake when computers are searched require that those devices be treated, to a certain extent, as a separate place.... If police come across a computer in the course of a search and their warrant does not provide specific authorization to search computers, they may seize the computer, and do what is necessary to ensure the integrity of the data. If they wish to search the data, however, they must obtain a separate warrant.
>
> [...]
>
> Limiting the location of a search to "a building, receptacle or place"... is not a meaningful limitation with respect to computer searches.... [In physical space] police will not have access to items that are not physically present in the building, receptacle or place for which a search has been authorized. While documents accessible in a filing cabinet are always at the same location as the filing cabinet, the same is not true of information that can be accessed through a computer.... *When connected to the Internet, computers serve as portals to an almost infinite amount of information that is shared between different users and is stored almost anywhere in the world*. Similarly, a computer that is connected to a network will allow police to *access* information on other devices. *Thus, a search of a computer connected to the Internet or a network gives access to information and documents that are not in any meaningful sense at the location for which the search is authorized*. [Emphasis added]

As a result, search and seizure warrants that relate to searching a computer must treat the computer and cyberspace as its own physical space. The Court concluded,

> In effect, the privacy interests at stake when computers are searched require that those devices be treated, to a certain extent, as *a separate place*. [Emphasis added]

Conclusion

As we have seen in the two leading cases on cybertrespass, *CompuServe* and *EBay*, the courts ostensibly applied the law of trespass to chattels while really applying the law of trespass to real property:

> While ostensibly about the protection of chattels, [cyber] trespass is really about the protection of information: the Web site may just be a function of the server, but *it is the Web site that is actually being protected by electronic trespass*. [Italics added][156]

Hunter stated likewise:

> Cyberspace is a place that conforms to our understanding of the physical world, with private spaces such as websites, email servers, and file servers, connected by the public thoroughfares of the network connections. Viewed through the filter of the CYBERSPACE AS PLACE metaphor, computer trespass does not just infringe on one's right to use the personal property of one's computer system. Instead, the action becomes a trespass against a form of quasi land that exists online. Trespasses to land have always been considered more serious than the equivalent actions against personal property.[157]
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> [...]
>
> [Because] the CYBERSPACE AS PLACE metaphor made personal property seem more like real property, the two different causes of action have become conflated.[158]

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[156] James Macdonald, "Electronic Trespass in Canada: The Protection of Private Property on the Internet," *Canadian Journal of Law and Technology* (2006): 168
[157] Dan Hunter, "Cyberspace as Place and the Tragedy of the Digital Anticommons," *California Law Review 91 (2001):* 481-482
[158] Hunter, "Cyberspace as Place," 487

Some legal commentators have applauded the development of cybertrespass while others have deplored it. Epstein, who applauds the new tort, notes that changing an address in cyberspace has repercussions analogous to changing an address in physical space:

> To think of a fixed Internet site, or the equipment that supports it, as though it were a chattel or a personal property is to miss the operative distinction of the earlier law, where "moveables" was often used as a synonym for personal property and "immovables" as a synonym for real property. The blunt truth is that an Internet site is fixed in its cyberspace location; to change from one address to another risks the loss of its customer base, just like any ordinary store runs the risk of losing its customers when it changes locations. *In these circumstances, cyberspace looks and functions more like real property than chattels. If one is forced to choose between the two sets of rules, then manifestly the real property rules offer a better fit*. [Emphasis added][159]

Lemley, on the other hand, deplores cybertrespass:

> As a technical matter, of course*, the idea that the Internet is literally a place in which people travel is not only wrong but faintly ludicrous*. No one is "in" cyberspace. The Internet is merely a simple computer protocol, a piece of code that permits computer users to transmit data between their computers using existing communications networks. [Emphasis added][160]
>
> [...]
>
> These courts have failed to understand how the Internet is different from the physical world. They have not understood that no one "enters" websites. Rather, defendants in these cases merely sent requests for information to a web server that the plaintiff itself opened to the public, and the plaintiff's own server sent

[159] Epstein, "Cybertrespass," 83
[160] Mark Lemley, "Place and Cyberspace," *California Law Review* 91 (2003): 523

> information in return. They have not understood that the requests for information that… BE sent did not exclude others from using the site. They have not understood that cases of this sort were really efforts to control the flow of information to or from a site. Because they had land rather than information in mind, these courts forgot that the information at issue in these cases is a public good to which we have never applied the "inviolability" rules of real property. The courts did not understand these things, and so they got the cases wrong, creating a general tort of stunning breadth.[161]

Lemley is incorrect in saying that the courts "failed to understand how the Internet is different from the physical world": Judge Whyte of the *Ebay* case clearly understood the analytic difficulty. He understood that if the Internet is viewed as chattels (e.g. if he had to deal with only the physical Internet), he could not grant injunctive relief. He understood that though it might seem contrary to legal doctrine, it was more appropriate to compare EBay's computers to real property (like a "brick and mortar auction house") than to chattels. His judgement reflected the "intuitive sense that cybertrespass involves an invasion of someone's *space*, not just interferes with their *things*."[162] Similarly, the Supreme Court of Canada was well aware of that a computer connected to the Internet was quite unlike a receptacle like a filing cabinet.

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[161] Mark Lemley, "Place and Cyberspace," *California Law Review* 91 (2003): 528
[162] Olson, "Limits of Metaphor," 14

Conclusion

Everyone uses spatial terms when referring to the Internet, but it is difficult to determine why that is so. This thesis is such an attempt. I have argued that we use spatial terms because we use *movement through physical space* as a model (or metaphor) for using the Internet. As shown in Chapter 1, metaphors and models allow us to transfer our reasoning about one thing to another thing. In Hertz's words, "we form for ourselves images or symbols of external objects; and the form which we give them is such that the necessary consequents of the images in thought are the images of the necessary consequents in the nature of the things pictured."[163]

In Chapter 2 I argued that we use spatial terms in talking about the Internet because both physical space and cyberspace are made up of *positions* and both contain ordered sequences of positions called *paths*. Paths in both physical space and cyberspace connect every position to every other position. *Directedness* and *length* can be attributed to paths in both physical space and cyberspace. Finally, *access* to sites can be limited in both physical space and cyberspace, creating *separated regions*.

These commonalities allow us to use spatial language when we talk about using the Internet. Ultimately, it *feels* like we "pass among various virtual places in complex ways, not unlike a driver or pedestrian navigating through a city of spaces."[164] As a result, using the Internet *feels like* travelling through physical space.

In Chapter 3 I argued that, because cyberspace feels like physical space, we behave in one as we would in the other. Through delineation and personalization, we stake claims over regions of cyberspace, organizing cyberspace into public and private spaces. The courts have recognized these analogies between physical space and cyberspace by applying the criteria for trespass to real property and search warrants to the Internet.

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[163] Hertz, supra 13
[164] Adams, "Topologies," 93

Lemley said that the idea that the Internet is a place where people travel is "not only wrong but faintly ludicrous"[165], and that courts who hold otherwise "have failed to understand how the Internet is different from the physical world".[166] Though coming at it from a very different angle, Barlow, too, concluded that the Internet is different from the physical world. He said:

- "Your legal concepts of property, expression, identity, movement, and context do not apply to us. They are all based on matter, and there is no matter here."
- "We must declare our virtual selves immune to your sovereignty, even as we continue to consent to your rule over our bodies."
- "Nor do you possess any methods of enforcement we have true reason to fear."

In Chapter 3, I reviewed two cases where the contentions of Lemley and Barlow were rejected, the cases of *CompuServe Inc. vs. Cyber Promotions Inc.* and *eBay vs. BE.* It is instructive to analyze how Hertz's theory of models applies to Judge Whyte's reasoning in *eBay v. BE.*

In *eBay*, BE used eBay's website in a way that eBay found offensive. EBay asserted that BE's bots *invaded its website.* As BE framed it, BE merely prompted eBay's servers to send it data. The issue was whether the 'property' being trespassed upon was eBay's "website" (a "region" of "cyberspace") or eBay's servers (pieces of equipment in physical space).

If eBay.com is compared to a chattel – say, to pieces of equipment – then there are no grounds for an injunction because eBay suffered no damages. If eBay.com is compared to real property – say, to an auction house – then there are grounds for an injunction, because BE's use is an "insult" to eBay's property rights, and damage is inherent in the very act. Using Hertz's analysis, if eBay.com is like equipment, the "necessary consequent" is that eBay loses; if eBay.com is like an auction house, the "necessary consequent" is that eBay wins.

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[165] Lemley, "Place and Cyberspace," 523
[166] Lemley, "Place and Cyberspace," 528

Lemley and Barlow say that the Internet is different from the physical world, and they are right, of course. They are also of course wrong. The question is not whether the Internet is *like* or *unlike* they physical world, for it is both. The question is whether, for the purposes for the inquiry at hand, the similarities are more important than the differences, or vice versa. In *eBay v. BE*, Judge Whyte found that similarities between eBay.com and an auction house to be more important, and granted the injunction.

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