NETWORK AESTHETICS[*]

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Abstract: Previous software design approaches (especially those of artificial intelligence) are closely tied to a commonsense aesthetics, i.e., an aesthetics that presumes a commonsense, a predictably emergent commonsense, or the uncanny, interference of the commonsense world. An alternative to these approaches must be found if we are to design for cross-cultural, global networks where a potential, or virtual, commonsense is contingent upon the possible (but not necessarily probably) emergence of a community of people who create their own stable semantic and social structure through continued interaction on the Internet. This new aesthetics, therefore, must be useful for the practices of design for emergent online communities.[1]

[*] to appear in *Database Aesthetics*, Victoria Vesna, Editor (Minneapolis, MN: University of Minnesota Press, forthcoming)

[1] Parts of this chapter appear in Warren Sack, "Artificial Intelligence and Aesthetics," in *The Encyclopedia of Aesthetics, Volume 1*, editor-in-chief Michael Kelly, editor-in-chief (New York: Oxford University Press, 1998). A version of this chapter appeared in Warren Sack, *Design for Very Large-Scale Conversations*, Unpublished Ph.D. Dissertation, (MIT Media Laboratory: Cambridge, MA, 2000).

Introduction: User-Friendly, Commonsensical Interface Design

In order for an interface to work, the person has to have some idea about what the computer expects and can handle, and the computer has to incorporate some information about what the person's goals and behaviors are likely to be. These two phenomena – a person's "mental model" of the computer and the computers "understanding" of the person – are just as much a part of the interface as its physical and sensory manifestations. … Faced with this nightmare, our seminar at Atari abandoned the topic and we turned our attention to more manageable concepts, such as the value of multisensory representations in the interface.[2]

Brenda Laurel unearths a potentially mountainous obstacle for interface designers. Most interface designers want to create something that is "user friendly," i.e., easy to use. Some of these designers have taken the approach of graphically-sophisticated, direct manipulation interfaces that are intuitive to use.[3] In contrast, artificial intelligence (AI) researchers often insist that the interface *per se* is not that important for the goal of "user friendly" software. If the computer's "understanding" of the person is a deep and profound understanding, then the computer can anticipate or sensitively perceive what a given person wants and fulfill those wants with minimal interaction with the user. This has been called the "intelligent agents" approach to interface design.[4]

Note, however, that both the agents and the graphical interface approaches require some notion of what might be called *commonsense*, or commonsense knowledge. The AI researchers assume that the commonsense can be coded into a computer program so that the computer can "know" what the person knows. The graphical interface designer assumes that an intuitive interface is one that does not require a user to read a thick manual before the user can use it. In other words, the interface should be designed so that the user – does not have to rely on some specialized knowledge but, rather -- can rely on their own commonsense to use the interface.

Many AI researchers have believed that this commonsense can be coded as a computer program. Graphical interface designers do not necessarily think that the commonsense can be coded, but they must at least rely on their own intuitions about what is commonsensical in order to determine if an interface design is in practice easy to use without specialized, non-commonsense, knowledge. But, what is commonsense? Marvin Minsky, one of the founders of AI said the following in a recent interview:

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[2] Brenda Laurel, *Computers as Theater* (Reading, MA: Addison-Wesley Publishing Company, 1991), 12-14.

[3] Ben Schneiderman, *Designing the User Interface: Strategies for Effective Human-Computer Interaction* (Reading, MA: Addison-Wesley, 1987).

[4] Nicholas Negroponte, *Being Digital* (New York: Knopf, 1995).

Q. How do you define common sense?
A. Common sense is knowing maybe 30 or 50 million things about the world and having them represented so that when something happens, you can make analogies with others. If you have common sense, you don't classify the things literally; you store them by what they are useful for or what they remind us of. For instance, I can see that suitcase (over there in a corner) as something to stand on to change a light bulb as opposed to something to carry things in.[5]

Minsky's definition of commonsense can be discussed using a linguistic terminology. Given a term like "suitcase" it should be possible to associate it with actions like "carry" and "stand." I.e., those who possess commonsense should be able to employ "suitcase" as the indirect object of the verb "stand" and "carry." However, expressed in this terminology, it becomes clear that there are set of cultural dependencies implicit in Minsky's definition. What parts of commonsense are missing in the knowledge of a non-English speaker who doesn't know the word "suitcase"? Probably nothing is missing for speakers of a language that have some equivalent to "suitcase" (e.g., "une valise" in French). But, more importantly, what is different, missing, or added for those whose language or culture contains nothing like a suitcase?

Some have suggested that it might be possible to divide up commonsense into two kinds: a culturally dependent commonsense knowledge and a culturally-independent sort of knowledge:

…I have suggested that people analyze the world, sort it into categories, impose structure on it, in order to avoid being overwhelmed by its richness. I have implied that this procedure is not deliberate: the widely held notion of "common sense" suggests that people believe that their theory of the way the world works is a natural reflection of the way the world does work. If we look at the sources of categories, we find that some are natural in origin, but the majority are social. Research suggests that a number of basic "cognitive categories" do arise in individuals naturally, being a product of the way we are constructed biologically. These include basic colour categories, such as black and white, red and green; certain geometrical figures, such as circle, triangle, and rectangle; notions of movement, such as up, down, forward, backward; logical relationships, such as oppositeness, identity, and causation. But the majority of our ideas are not natural. … What counts as an instance of a category is subject to negotiation and revision. Can a lion count as a pet? Yes, the magistrates say, provided it is locked up securely. Clearly the idea of "pet" cannot be derived from any list of actual animals; it is not a natural feature of certain animals but a property of the culture's system of attitudes towards animals.[6]

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[5] Claudia Dreifus, "A Conversation with Dr. Marvin Minsky: Why Isn't Artificial Intelligence More Like the Real Thing?," *New York Times*, July 28, 1998; or see http://www.nytimes.com/library/national/science/072898sci-minsky.html

[6] Roger Fowler, *Linguistic Criticism, Second Edition* (New York: Oxford University Press, 1996), 27.

Such a culturally-dependent/culturally-independent division of commonsense – like the one offered by Roger Fowler in the quote above – might be a workable means for interface and/or AI designers to approach their work with. However, such an approach would still require different designs for different cultures if the software was suppose to operate in a domain that did not occupy a "basic" category of knowledge. Conversation, for instance, is a culturally dependent domain if only because topics of conversation are rarely if ever entirely culturally independent. Very large-scale conversation is an even more eclectic domain because, as it is presently practiced on the Internet, participants can come from a wide diversity of cultural backgrounds and so what is or is not commonsensical cannot be enumerated beforehand.

Instead, what is necessary is a design perspective that allows one to see how, for instance over the course of a long-term conversation, commonsense is produced, reproduced, extended, and changed by a group of – potentially culturally diverse – participants. The political philosopher Antonio Gramsci gives us just such a picture of commonsense:

Every social stratum has its own "common sense" and its own "good sense," which are basically the most widespread conception of life and of men. Every philosophical current leaves behind a sedimentation of "common sense": this is the document of its historical effectiveness. Common sense is not something rigid and immobile, but is continually transforming itself, enriching itself with scientific ideas and with philosophical opinions which have entered ordinary life... Common sense creates the folklore of the future, that is as a relatively rigid phase of popular knowledge at a given place and time.[7]

From this perspective, commonsense is accumulated and transformed through the process and productions of science, philosophy and other powerful conversations, discourses, and practices. This is a perspective that has been useful for understanding the workings of older media (e.g., newspapers, television, film, etc.) and could, potentially, be of use to understand and design new forms of media like those of the Internet.[8]

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[7] Antonio Gramsci. *Selections from the Prison Notebooks* (London: Lawrence and Wishart, 1971), 326; as cited in Stuart Hall. "The rediscovery of 'ideology': return of the repressed in media studies," in *Culture, Society, and the Media*, edited by Michael Gurevitch, Tony Bennett, James Curran, and Janet Woollacott (New York: Routledge, 1982), 73.

[8] According to Stuart Hall, Anglo-American media studies of the early-twentieth century saw the media (newspaper, television, etc.) as producers of content that "reflected" the "common sense" of the larger public. The media was said to objectively write down and distribute the consensus, or *sensus communus*, that was produced by the public independent of the media. Hall argues that, later, media studies came to recognize the media's role in producing, rather than simply reflecting community values and common sense. By being the only "voice" which could reach across the nation and even across the world, the electronic and print media framed public discourse, and thus public

However, this is probably easier said than done. Not just interface designers, but many other kinds of artists and designers have consciously or unconsciously relied on some notion of "culturally-independent" commonsense to make aesthetic decisions. To ferret out this dependency in software design and find a workable alternative for thinking about the aesthetics of Internet interface design, this chapter will first explore how commonsense has been discussed and used in software, specifically artificial intelligence design. It is shown, historically, that the connections between aesthetic decisions and terms central to AI work – especially goals and commonsense – are longstanding concerns. It is thus necessary to get some historical and philosophical perspective on discussions of commonsense and aesthetics in order to propose true alternatives. The main goal for this chapter is the formulation of an approach to the design of interfaces for Internet-based software that can show the production of commonsense (especially the commonsense of conversation) and who is responsible for its production. Rather than depending upon an *a priori* defined notion of commonsense, a workable approach to the aesthetics for Internet design must take into account the fact that commonsense is being produced and changed through the conversation itself. After looking at the history of AI, commonsense, and aesthetics, an alternative approach is outlined.

Artificial Intelligence and Aesthetics

Artificial intelligence (AI) is an area of research and design of “intelligent” computer hardware and software. The term “artificial intelligence” was coined for a conference at Dartmouth College held in the summer of 1956.[9] The Dartmouth conference brought together the majority of researchers who are today considered the founders of the field including John McCarthy, Marvin Minsky, Herbert Simon, Allen Newell, and others. While AI has primarily been a concern of computer scientists, its multidisciplinary membership (including also mathematicians, philosophers, engineers, and social scientists) was evident even at the time of the Dartmouth conference. AI did not have a name before the Dartmouth conference yet it, nevertheless, participates in older intellectual and design traditions which have investigated mechanical and symbolic systems and human cognition and perception for centuries. Consequently, as an area of design concerned with cognition and perception, AI can be understood as the latest manifestation of certain views of aesthetics which have their roots in older philosophical, scientific, and artistic projects.

The purpose of the following chapter sections is to give a short history of AI that highlights its relations with a Kantian (Immanuel Kant) view of aesthetics. Its

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“common sense,” simply through the editorial choice of which stories should be broadcast and which should be left untold. *Ibid.*

[9] Howard Gardner, *The Mind's New Science: A History of the Cognitive Revolution* (New York: Basic Books, 1985).

purpose is *not* to give a comprehensive overview of AI (see, instead, Shapiro[10] for one such overview). Instead, this chapter's focus is the intersection of AI and aesthetics and so it supplements, but does not largely overlap, two different histories that have been repeatedly told about (1) AI and science; and, (2) AI and art. A history of AI concerned with its scientific roots would emphasis its relations to the development of calculating machines, logic, and mathematics.[11] An art history of AI would, by contrast, detail its similarities and differences with ancient and modern myths, literatures, and depictions of robots, cyborgs, and artificially (re)created humans like Frankenstein's monster.[12] For expository purposes, these other histories (of AI, art, and science) are mostly left to the side so that a single, streamlined story, focusing on AI and aesthetics, can be told. At the end of these sections, the "streamlining" is questioned by examining some of AI's relationships to other (i.e., non-Kantian) aesthetics. This "unstreamlining" makes it possible to propose a set of alternatives to a commonsense-based aesthetics to interface design.

Early AI

Throughout its -- now over forty year -- history AI has never been a discipline without internal differences. Nevertheless, until about the mid-nineteen eighties it was possible to say that a large majority of AI researchers were concerned with the elaboration of a *rationalistic* understanding of cognition and perception.[13] Within the rationalistic tradition, human identity and the thinking, calculating mind tend to become conflated. AI's rationalistic bent can be understood by examining it as a reaction against behaviorism,[14] the approach that dominated the social sciences for most the first half of the twentieth century in the United States, and an outgrowth of cybernetics,[15] an interdisciplinary effort born during World War II to study social, biological, and electro-mechanical systems as systems of control and information.

Behaviorism and AI

Behaviorists' preference for studying external, empirically observable behaviors rather than, for example, a method of introspection or the analysis of verbal reports of others' thinking, effectively divided psychology (and other social sciences) from closely-related disciplines, like psychoanalysis, which were founded on the postulation of internal, mental structures and events. As

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[10] Stuart C. Shapiro (editor-in-chief) *Encyclopedia of Artificial Intelligence, Second Edition* (New York: Wiley, 1992).

[11] E.g., Gardner.

[12] Cf., Pamela McCorduck, *Machines who think: a personal inquiry into the history and prospects of artificial intelligence* (San Francisco: W.H. Freeman, 1979), 3-29.

[13] Terry Winograd and Fernando Flores, *Understanding Computers and Cognition: A New Foundation for Design* (Norwood, NJ: Ablex Pub. Corp., 1986).

[14] B.F. Skinner, *Science and human behavior* (New York: Macmillan, 1953).

[15]Norbert Wiener, *Cybernetics; or, Control and Communication in the Animal and the Machine* (New York: Wiley, 1955).

computers became more and more common, the behaviorists' hegemonic position in American social science began to wane. Behaviorists were unwilling to postulate the existence of intentions, purposes and complicated internal, mental mechanisms. Yet, during and after World War II, as computers were built to do more and more complicated tasks, not only computer engineers, but also the popular press began to call computers "electronic brains" and their internal parts and functions were given anthropomorphic names (e.g., computer "memory" as opposed to, for instance, the synonymous term the "store" of the computer). Concomitantly, some social scientists began to take seriously the analogy between the workings of a computer and the workings of the human mind.[16] This set of social scientists went on to found AI and cognitive science as a whole, the area of science that includes AI and a variety of other "computationally-inspired" approaches to cognition in linguistics, anthropology, psychology and neurophysiology.[17]

Cybernetics and AI

At the same time – i.e., during and immediately after World War II – the science of cybernetics gained increased prominence. Cybernetics differs from most work done within the confines of a strict behaviorism in at least two ways: (1) Whereas behaviorists postulated linear relationships between an external stimulus and an organism's response, cybernetics introduced the ideas of recursive (i.e., circular) relations between perception or sensation and action known as positive and negative feedback circuits. (2) While behaviorists avoided labeling any behavior "goal-directed" (because it would imply the postulation of internal representations), cyberneticians (re)introduced teleology into scientific descriptions of behavior.[18]

Subsequently, the earliest work in AI elaborated on the cyberneticians' usage of "goal-directed behavior" and de-emphasized external contexts and empirically observable stimuli, the pre-occupation of the behaviorists. Consequently, AI immediately began to diverge from cybernetics due to AI's neglect of an analysis of feedback from the environment. Some contemporary work addresses this early neglect, but early work in AI – e.g., the work of Newell, Simon, and Shaw[19] on the General Problem Solver (GPS) – only explored feedback insofar as the "external world" could be internalized in the computer. To work, GPS required that a full and accurate model of the "state of the world" (i.e., insofar as one can even talk of a "world" of logic or cryptoarthimetic, two of the domains in which GPS solved problems) be encoded and then updated after any action was taken (e.g., after a step was added to the proof of a theorem). This assumption – that

[16] Sherry Turkle, "Artificial Intelligence and Psychoanalysis: A New Alliance." *Daedalus*, 17(1) Winter 1988.
[17] Gardner.
[18] Steve Heims, *The Cybernetics Group* (Cambridge, MA,: MIT Press, 1991), 15.
[19] Alan Newell, J.C. Shaw, and Herbert A. Simon, "GPS, A Program That Simulates Human Thought" in *Computers and Thought*, ed. by Edward A. Feigenbaum and Julian Feldman (New York: McGraw-Hill, 1963), 279-293.

perception was always accurate and that all of the significant details of the world could be modeled and followed – was incorporated into most AI programs for decades and resulted in what became known to the AI community as the "frame problem;" i.e., the problem of deciding what parts of the internal model to update when a change is made to the model or the external world.[20] Not surprisingly, AI robots built around strict internal/external divisions sometimes exhibited extremely erratic behavior when the robots' sensors were even slightly inaccurate in the measurement of the external world.

AI as a Kantian Endeavor

Early AI's anti-behaviorist, inward turn to focus on internal representations (like "goals") led to, what can be understood as, the re-invention of philosophical rationalism's problems and "solutions." Or, since AI has routinely been concerned with the difficulties and sometimes the limits of rationality (expressed, for example, in Herbert Simon's notion of "bounded rationality"[21]), its "re-inventions" more specifically resemble, not rationalism *per se*, but philosophical responses to rationalism like, for example, Immanuel Kant's *Critiques*. Indeed, the rationalistic approach to perception and cognition pursued by a large majority of AI researchers until the mid-nineteen eighties can be explained in Kantian terms.

The following explanation of AI using Kantian terms relies on a well-known reading of Kant formulated by the philosopher Gilles Deleuze.[22] Deleuze's interpretation is akin to several other readings of Kant (notably, the work of Jean-François Lyotard[23]) that, collectively, might be viewed as the "post-structuralist" response to Kant.

Kant's comparison of aesthetical and teleological judgement[24] provides a framework for narrating how AI's original pre-occupations with teleology and neglect of aesthetics caused a series of crises for the field in the mid-nineteen eighties that initiated an "aesthetic turn"[25] in research motivating AI scientists and designers to pay increasing attention to issues of the body, the senses, and physical and social environments. While Kant's vocabulary provides a

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[20] J. Martins, "Belief Revision" in *Encyclopedia of Artificial Intelligence, Second Edition*, editor-in-chief Stuart C. Shapiro (New York: Wiley, 1992), 111.

[21] Herbert A. Simon, *The Sciences of the Artificial, Third Edition* (Cambridge, MA: MIT Press, 1996).

[22] Gilles Deleuze, *Kant's Critical Philosophy: The Doctrine of the Faculties*, translated by Hugh Tomlinson and Barbara Habberjam (Minneapolis, MN: University of Minnesota Press, 1984).

[23] Jean-François Lyotard*, Lessons on the analytic of the sublime: Kant's Critique of Judgment*, translated by Elizabeth Rottenberg (Stanford, CA: Stanford University Press, 1994).

[24] Immanuel Kant, *Kritik der Urtheilskraft, in Immanuel Kant's gesammelte Schriften, Volume V* (Berlin: Bey Lagarde und Friederich ,1790), 165-485.

[25] Warren Sack, "Artificial Human Nature" *Design Issues*, 13 (Summer 1997), 55-64.

convenient means of describing the problems and achievements of AI, within the literature of AI Kant is rarely mentioned, or, if mentioned, then only represented as formative of AI's parent discipline, cognitive science.[26] Here it is argued that Kant's vocabulary of aesthetics (as "spoken" by post-structuralism) is equal to the task of describing many important research issues in AI. No argument is offered to support the opinion that some sort of "equivalence" exists between AI and Kant's critical project.

In conflict with rationalists (like René Descartes) Kant argued for a limited role for teleological principles to supplement mechanical explanations.[27] Likewise, cyberneticians – in conflict with most behaviorists – argued for a limited use of teleology in coordination with the vocabulary of physics to describe the behavior of complex, non-linear systems. In the nineteen-fifties, when AI took up the vocabulary of teleology (i.e., "final cause") from cyberneticians, what was repressed – or at least foreclosed – for AI was the problematic status of the posited goals and purposes used to understand the behavior of complex systems. For Kant, teleological principles were considered to have no explanatory significance.[28] Instead, teleological judgement – in Kantian terms – was seen as a response to an apparent purposelessness of aesthetic judgement: "purpose" is a projection of the cognitive subject on nature, not an intrinsic property of nature itself. In contrast to Kant's careful re-introduction of teleology within a nuanced discussion of aesthetics – where teleology was seen as a *product of cognition*, but not necessarily an artifact useful for communication and explanation – AI researchers took teleology as a *basis for their scientific explanations of cognition*, problem solving, and learning. This difference of opinion concerning the explanatory significance of goals and purposes is so large that one might assume that any continued narration of AI as a type of "Kantianism" (as AI's history is here described) would be fruitless. However, the way in which AI has struggled with the questions of teleology (e.g., For whom do posited goals and purposes signify something meaningful?) is strikingly Kantian in its (AI's) recurrent appeal to "common sense", a faculty of great importance to Kant's critical philosophy.

Kant and Common Sense

"Faculty" (e.g., a "faculty of common sense") is a crucial yet ambiguous term in Kant's writings. For present purposes it suffices to say that a Kantian "faculty" is a potential or power to realize some end.[29] Computational approaches to philosophy, like those championed by AI, often equate "powers" to "computational processes" or (to use a less theoretical term) "computer programs." Thus, to draw an analogy between the writings of Kant and the

[26] Gardner; see also, Andrew Brook, *Kant and the Mind* (Cambridge, UK: Cambridge University Press, 1994).
[27] Howard Caygill, *A Kant dictionary* (Cambridge, MA, Blackwell Reference, 1995), 388.
[28] Kant, para. 61.
[29] Caygill, 190.

writings of AI researchers, it is necessary to imagine that Kant's "faculties" could be re-expressed in a variant, textual form: as computer programs with specific data structures, data flow, and control flow. Although this metaphorical comparison of the human cognitive faculties to computer programs may seem outlandish to many, it is a hallmark, not only of AI, but of all contemporary cognitive science.[30] To compare Kant's work to the research goals of AI it is not necessary to believe that this metaphor (mind as machine) is "true." Rather, it is only necessary for the reader to be able to imagine that AI researchers consider this metaphor to be true; or, if not true, then at least extremely useful.

Kant discusses three cognitive faculties: understanding, reason, and imagination. In the terminology of AI one might explain these faculties as classification (understanding), inference (reason), and schema or pattern matching (imagination). In addition to the three cognitive faculties, Kant describes three sorts of common sense: two legislated and one engendered.[31] The ways in which the three faculties described by Kant (of understanding, reason, and imagination) interrelate with one another are referred to as (1*) logical common sense*; and, (2) *moral common sense* when, respectively, (1) understanding, and (2) reason legislate over the two other complementary faculties. In contrast with these two legislated sorts of common sense, (3) *aesthetic common sense* is engendered when none of the faculties are regent, but when they all, nevertheless, work together even as they function autonomously and spontaneously. In the vocabulary of contemporary computer science, one might say that the differences between these three kinds of common sense are differences in "control structure"; i.e., differences concerning which (or whether) one computer program, program statement, or "faculty" is directing the others.

Kant's theories of *reflective judgement* (which includes both *aesthetic reflective* and *teleological reflective judgement*) function with the support of an engendered, aesthetic common sense. This common sense is engendered when, for example, the faculty of reason compels the faculty of imagination to confront its limits by attempting to schematize a perception of the formless or the deformed in nature (a state referred to as the *sublime*). According to Deleuze, the aesthetic common sense should not be understood as a supplement to logical and moral common sense but that which gives them a basis or makes them possible since the faculties of understanding and reason could not take on a legislative role if it were not first the case (as in the accord of an aesthetic common sense) that they are each capable of operating in free subjective harmony.[32] The implications for AI of this conceptualization of common sense – like Kant's aesthetic common sense – will play an important role in the following discussion.

AI and Common Sense

[30] Gardner, 6.
[31] See Deleuze, 49-50.
[32] Deleuze, 50.

The neo-Kantian, Jean-François Lyotard draws an analogy between Kant's description of *reflective judgement* (a mode of thought which works from the particular towards the universal as opposed to *determinant judgement* which proceeds in the inverse direction) and AI researchers' (especially Marvin Minsky's) descriptions of "frame-based" thought and perception.[33] Minsky's "frames" proposal[34] was an attempt to describe common sense thought in humans and its possibilities in computers. Minsky, McCarthy,[35] their students, and colleagues in AI were concerned with the following question about common sense: What is the structure and content of common sense such that it allows one to quickly draw useful conclusions from a vast array of existing knowledge and perceptional data? One of the immediate outgrowths of this research was a series of "frame-based" computer programming languages with control structure statements very unlike previous programming languages.[36] From this, AI, point of view, common sense is a legislative faculty, i.e., a control (or controlling) structure that allows a system to turn its attention away from nonsense so that it can concentrate on the sensical or what is implied by the commonsensical. In other words, in Kantian terms, AI's analysis of "common sense" was largely (and still is in some circles) limited to "legislated common sense" -- "logical common sense" and "moral (i.e., 'reason-legislated') common sense" -- and had (until recently) completely neglected "aesthetic common sense," an unlegislated state of relations between understanding, reason, and imagination.

AI and Non-Military Concerns

Such was the case until the mid-nineteen eighties when two "events" motivated a reappraisal within AI of the issues of aesthetics, including the role of the body and the senses in cognition. The first "event" was the commercial success of a genre of AI computer programs called "expert systems."[37] For the first thirty years of its existence (in the United States) AI was mostly academic research funded by the military. Then, in the mid-eighties, business concerns began funding the development of expert systems to automate a variety of white-collar work. While the U.S. Department of Defense had been content to finance long-term research in which it was presumed that theoretical work might, one day, be of practical interest, the new benefactors of AI demanded empirically evaluated,

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[33] Jean-François Lyotard, *The Inhuman: Reflections on Time*, translated by Geoffrey Bennington and Rachel Bowlby (Stanford, CA: Stanford University Press, 1991), 15.

[34] Marvin Minsky, "A Framework for Representing Knowledge" in *Mind Design: Philosophy, Psychology, Artificial Intelligence*, ed. by John Haugeland (Cambridge, MA: MIT Press, 1981).

[35] John McCarthy, *Formalizing Common Sense: Papers by John McCarthy*, edited by Vladimir Lifschitz and John McCarthy (Oxford, UK: Intellect, 1998).

[36] E.g., R. Bruce Roberts and Ira P. Goldstein, "The FRL manual," (Cambridge, MA: Massachusetts Institute of Technology, 1977).

[37] Edward A. Feigenbaum and Pamela McCorduck, *The fifth generation: artificial intelligence and Japan's computer challenge to the world* (Reading, MA: Addison-Wesley, 1983).

immediate results. What soon became clear was that many expert systems were "brittle," i.e., they performed competently within a narrow domain of problems, but if the problems were posed in a slightly different manner, or if slightly different types of problems were posed to the systems, the systems responded in erratic and erroneous ways. Moreover, it was noted by users of the systems that the systems were difficult to communicate with: one needed to pose problems in a specially constructed, artificial language and, often, after receiving a solution from a system it was impossible to get the system to explain the rationale for its solution. Expert system adherents claimed the problem was simply that more rules needed to be added to the "brittle" expert systems to make them "flexible." Expert system opponents, often using a philosophical vocabulary of (Martin Heidegger's) phenomenology, claimed that rules were inadequate to the task of articulating the means of human expertise and, thus, no number of rules could allow a machine to match the skills of a human expert.

The second "event" was the U.S. military's loss of funding in the late-eighties due to the end of the Cold War with the Soviet Union. Both "events" pushed AI researchers to look for new funding sources and "applications" in finance, advertising, and entertainment.

Two Strands of Aesthetic AI Research

This exodus from the isolated, military-industrial funded laboratories fostered two strands of research. One strand is attributable to a diverse collection of researchers who, for the purposes of this chapter, will be called the "neo-Encyclopediaists." The second strand of researchers will here be called the "computational phenomenologists." Both of these strands have longer histories of existence, even within the lifetime of AI itself, but they were given more funding and attention after the two, above-mentioned "events." One of the major distinctions between these two strands of researchers is this: while the neo-Encyclopediaists (or at least their predecessors in symbolic AI; e.g., Minsky) feel that "common sense" can be cataloged as a system of rules with intentional content,[38] the computational phenomenologists do not believe that "common sense" can be articulated in the structure of rules.

The "rules" under scrutiny by the computational phenomenologists can be understood as a certain specialized form of computer program articulated as a series of IF-THEN statements (e.g., "IF the water is steaming and bubbling, THEN its temperature is probably 100 degrees Celsius"). But, the term "rules" can also be understood as synecdochically referring to a larger class of computer programs (including, for example, Minsky's "frames", and what others have called "schemata," or "scripts"[39]).

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[38] Cf., Hubert L. Dreyfus with Harrison Hall (eds.) *Husserl, intentionality, and cognitive science* (Cambridge, MA: MIT Press, 1982), 23.

[39] Roger C. Schank and Robert P. Abelson, *Scripts, plans, goals and understanding: An inquiry into human knowledge structures* (New York: John Wiley and Sons, 1977).

The neo-Encyclopediaists

Motivated by the observation that most AI programs do not contain enough schemata or rules to deal with unforeseen circumstances (c.f., the "brittleness" of expert systems mentioned above), the neo-Encyclopediaists[40] are attempting to produce huge catalogs of "common sense" (i.e., computer programs and databases). Some of these efforts are largely accomplished "by hand" whereby dozens of people are employed for years to encode a myriad of mundane details and rules (e.g., "water is a liquid", "what goes up must come down"). Other efforts are aided by statistical and machine learning techniques to augment or build such catalogs. The most well known of these efforts has been a ten-year project called CYC (originally short for enCYClopedia) financed largely by corporate sponsors.[41] CYC and a handful of other efforts are the contemporary offspring of Minsky's[42] and McCarthy's[43] proposals for representing common sense, oftentimes referred to as "symbolic AI."

However, while work in symbolic AI has always stressed the importance of teleological and "intentional" representation, newer work in "computational linguistics" (a field that intersects with the AI sub-field of "natural language processing") contributes to the neo-Encyclopediaists' efforts without necessarily ascribing the same importance to teleology. Computational linguistic, neo-Encyclopediaist work is often described as the latest extension to the long-standing field of lexicography, the discipline that has historically been responsible for the construction of encyclopedias, dictionaries, and thesauri.[44] This turn away from teleology in recent neo-Encyclopediaist work might be seen as a renewed interest in the freedom of the (Kantian) imagination and its power to schematize without any concept,[45] i.e., an interest in the basis for an aesthetic common sense (taste). One difference, however, is, for instance, the dependence of much recent computational linguistic work on the form of very simple "schemata" or "rules" (e.g., the form and limitations of Markov models) versus the postulation of no schematic influence whatsoever by Kant.

The Computational Phenomenologists

While computational phenomenology can be understood to be in opposition to the project of the neo-Encyclopediaists, the neo-Encyclopediaists' turn away from teleology (in favor of lexicography) makes it clear that this opposition is more of a

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[40] The first Encyclopediaists were Denis Diderot, Jean Le Rond d'Alembert and their colleagues who wrote and published the *Encyclopédie* from 1751 until 1772.
[41] Douglas Lenat and R. Guha, *Building large knowledge-based systems: representation and inference in the Cyc project* (Reading, MA: Addison-Wesley, 1990).
[42] Minsky.
[43] McCarthy.
[44] Yorick A. Wilks, Brian M. Slator and Louise M Guthrie, *Electric words: dictionaries, computers, and meanings* (Cambridge, MA: MIT Press, 1996).
[45] Kant, para. 35.

tension than an unbridgeable gap. In fact, the two strands can both be understood as pursuing different forms of phenomenology, one more Edmund Husserl-inspired (i.e., transcendental) and the other more Martin Heidegger-inspired (i.e., existential).

Disbelief in structured rules with intentional content has spawned several different research paradigms some of which will here be subsumed under the label of "computational phenomenology." One paradigm, known as "connectionism"[46] is an attempt to replace rules with digitally simulated "neural nets." Another paradigm, "situated action"[47] or "behavior-based AI"[48] couples the "neural nets" of connectionism to robotic (hardware and software) bodies with sensors. The research agenda of the latter group is, in many ways, a direct descendent of cybernetics insofar as it insists on the employment of feedback circuits and the disruption of internal representation versus external world dichotomies created in and by early AI work. Finally, what is here labeled computational phenomenology, is also meant to encompass recent work in "distributed AI"[49] and "multi-agent systems"; such work takes its metaphors of interaction from social systems (e.g., the systems of various scientific communities for the publication and archiving of journal articles) instead of the metaphors of the isolated thinker preferred by early-AI researchers.

The Aesthetic Turn

The work of the computational phenomenologists constitutes an "aesthetic turn"[50] in AI research since they focus attention on the aesthetic dimensions of cognition including the senses, the body, and the social and physical environment of perception. While the neo-Encylopediaists might be seen as an outgrowth of an older, "symbolic AI," computational phenomenology has been formulated in opposition to symbolic AI. Pivotal to the computational phenomenologists' position has been their understanding of common sense as a negotiated process as opposed to a huge database of facts, rules, or schemata. This position is often repeated by the computational phenomenologists: "It should come as no surprise that the area in which [symbolic] artificial intelligence has had the greatest difficulty is in the programming of common sense. It has long been recognized that it is much easier to write a program to carry out abstruse formal operations than to capture the common sense of a dog. This is an obvious consequence of

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[46] James L. McClelland and David E. Rumelhart (eds.), *Parallel Distributed Processing: Explorations in the Microstructure of Cognition; Volumes 1 and 2* (Cambridge, MA: MIT Press, 1986).

[47] E.g., Philip E. Agre and David Chapman, "Pengi: An Implementation of a Theory of Activity," in *Proceedings of the Fifth National Conference on Artificial Intelligence* (Seattle, WA: Morgan Kaufmann, 1987), 268-272.

[48] Rodney Brooks, "Intelligence Without Representation," *Artificial Intelligence* 47 (1991): 139-160.

[49] Les Gasser, "Social Conceptions of Knowledge and Action: Distributed Artificial Intelligence and Open Systems Semantics," *Artificial Intelligence* 47 (1991): 107-138.

[50] Sack.

Heidegger's realization that it is precisely in our 'ordinary everydayness' that we are immersed in readiness-to-hand."[51] In other words, common sense is a faculty engendered by our encounters with "nature" and others, i.e., that said by Kant (according to Deleuze) to engender an "aesthetic common sense."

Husserl, Heidegger, and AI

The references to Martin Heidegger used by the computational phenomenologists can be seen as a contemporary manifestation of a debate between AI software designers that began as a philosophical debate initiated by Hubert Dreyfus.[52] Dreyfus and several of his colleagues (especially John Searle) have been critiquing AI (particularly symbolic AI) for over thirty years. Dreyfus has pointed out the close philosophical affinities between the projects of symbolic AI and Edmund Husserl's transcendental phenomenology and its differences from a Heideggerian existential phenomenology.[53] In particular, Dreyfus details the relationship between Husserl's philosophical project and Marvin Minsky's "frames" proposal for encoding common sense.[54] (Dreyfus and Hall, 1982, pp. 19-22).

Given Husserl's deep intellectual debts to Kant, it is understandable that Lyotard would compare Minsky's proposal to Kant's idea of reflective judgement.[55] Thus, these philosophical critiques of AI (e.g., of Dreyfus and Lyotard) give one a means of seeing how symbolic AI's proposals to encode common sense (e.g., Minsky's proposal) inherit the limitations of Kant and Husserl; and, also, the critiques illustrate how Heidegger's critique of Husserl is reflected in the computational phenomenologists' critique of symbolic AI. However, despite the frequent citation of Heidegger's work within the literature of computational phenomenology, it is not clear whether computational phenomenology is a Heideggerian project. In many ways, computational phenomenology is a self-contradictory[56] effort to "enframe"[57] Heidegger's critique of Husserl in a set of technologies.[58]

AI and Cultural Difference

When AI has been dependent upon a Kantian-influenced vocabulary (e.g., the

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[51] Winograd and Flores, 98.
[52] Hubert L. Dreyfus, *What computers can't do; a critique of artificial reason. 1st edition* (New York: Harper and Row, 1972).
[53] Dreyfus and Hall, 2-27.
[54] Dreyfus and Hall, 19-22.
[55] Lyotard, 1991, 15.
[56] Cf., Richard Coyne, *Designing Information Technology in the Postmodern Age* (Cambridge, MA: MIT Press, 1995), 177.
[57] Martin Heidegger, *The question concerning technology, and other essays*, translated by William Lovitt (New York: Garland Pub., 1977).
[58] Cf., Hubert L. Dreyfus, *What Computers Still Can't Do* (Cambridge, MA: MIT Press, 1992).

terms “schema,” “common sense,” and “teleology”) its inability to articulate cultural difference is reminiscent of Kant’s own limitations or oversights (e.g., with respect to gender differences). For example, in AI discussions of common sense, few researchers have asked *whose* common sense is under consideration preferring, instead, to assume that common sense is common to all humans and not culturally specific.

Even with the “aesthetic turn” in AI, practically no work has been done in AI on culture (e.g., the (re)production of differences of gender, sexuality, class, race, nationality, etc.). A belief in aesthetics as culturally invariant is obviously a useful one for a liberal, Enlightenment politics that Kant’s theories of universal subjectivity contribute to. AI and cognitive science, in general, are very much in the vein of Kant’s cosmopolitan universalism in their hypothesis of universal cognitive mechanisms “executable” on all sorts of (silicon and carbon-based) “hardware.” What this hypothesis of a universal subjectivity leaves unthought is that significant differences between people do exist and, furthermore, the introduction of powerful technologies, like AI, can change people even more by changing their day-to-day lives. As a result, AI and its critics have largely been blind to the ethical implications of AI[59] and its implications for post-Kantian aesthetics.

Nevertheless, some AI work has been done addressing what could be *interpreted* as cultural difference. For instance, ideological difference has been modeled[60] as a difference of teleology (i.e., a difference of goals and the interrelationships between goals); expert/novice differences in education and learning have been modeled as differences of number, detail, type, and interrelationships of rules and schemas;[61] differences between the mentally healthy and the mentally ill (e.g., Kenneth Colby’s simulation of a paranoid mind[62]) have been computationally modeled as differences of beliefs and intentions. Although such work does engage the problematics of such important cultural phenomena as ideology, education, and mental illness, it implicitly assumes that differences of culture are personal differences by attempting to represent them exclusively with “mental,” “internal” constructs like goals, plans, beliefs and intentions. Such work reduces the public to the private by ignoring the ways in which social interaction can be (re)productive of cultural difference.

This weakness of AI is not surprising given that the central metaphor of the

[59] Sack, 1997.

[60] E.g., Robert P. Abelson and J.D. Carroll, "Computer Simulation of Individual Belief Systems," *American Behavior Scientist*, 8 (1965): 24-30; Jaime Carbonell, *Subjective Understanding: Computer Models of Belief Systems*, Ph.D. Thesis (New Haven, CT: Yale University, 1979).

[61] E.g., Etienne Wenger, *Artificial Intelligence and Tutoring Systems: Computational and Cognitive Approaches to the Communication of Knowledge* (Los Altos, CA: Morgan Kaufmann Publishers, 1987).

[62] Kenneth Mark Colby, “Modeling a Paranoid Mind,” *Behavioral and Brain Sciences*, 4 (1981): 515-534.

discipline has been – not *minds* – but *mind*-as-machine. Marvin Minsky's more recent work[63] stretches this metaphor by hypothesizing that a mind is composed of a society of "agents." This work is a shift away from a Kantian vocabulary to a vocabulary of psychoanalysis.[64] Other, newer work in distributed artificial intelligence,[65] multi-agent systems,[66] artificial life,[67] computational models of discourse,[68] and computer-supported cooperative work[69] stretches the central metaphor of AI further by making groups and communities the object of study (rather than the mind of a single individual). Increasingly these new offshoots of AI are not simply stretching the boundaries of AI but, rather, creating independent disciplines.

However, even within these newer disciplines, little attention has been paid to the issue of cultural difference. Instead, what is predominantly stressed is consensus and questions like the following: Within a community of agents how can significant difference and miscommunication be overcome to allow for coordination, agreement, and "common knowledge"?[70]

Turing's Imitation Game

Ironically, cultural difference (specifically gender) is central to what is considered by most AI researchers to be the founding essay of AI. In his essay, "Computing Machinery and Intelligence,"[71] Alan Turing proposes a Wittgensteinian[72] (Ludwig

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[63] Marvin Minsky, *The Society of Mind* (New York: Simon and Schuster, 1986).

[64] For a description of "agents" and Freud's "realist" model of the ego see Elizabeth A. Grosz, *Jacques Lacan: a feminist introduction* (New York: Routledge, 1990).

[65] E.g., A.H. Bond and Les Gasser (eds.), *Readings in Distributed Artificial Intelligence* (Los Altos, CA: Morgan Kaufmann Publishers, 1988).

[66] E.g., Ronald Fagin, J.Y. Halpern, Y. Moses and M.Y. Vardi, *Reasoning About Knowledge* (Cambridge, MA: MIT Press, 1995).

[67] E.g., Rodney Brooks and Pattie Maes (eds.) *Artificial life IV: Proceedings of the Fourth International Workshop on the Synthesis and Simulation of Living Systems* (Cambridge, MA: MIT Press, 1994).

[68] E.g., Barbara Grosz and Candace Sidner, "Attention, intentions, and the structure of discourse," *Journal of Computational Linguistics* 12 (3) (1986): 175-204.

[69] Winograd and Flores.

[70] Cf., Fagin et al.

[71] Alan Turing, "Computing Machinery and Intelligence," *Mind*, Volume LIX, No. 236 (1950): 433-460.

[72] Turing's essay has been intensely discussed for half a century and yet few of these discussions link Turing's method of rephrasing the question "Can machines think" as a (language) game to the methodology that Wittgenstein used more generally to reanalyze the so-called problems of philosophy as language games. Two sorts of evidence make this link between Turing's thinking and Wittgenstein's plausible. First of all, several scholars tell of Turing/Wittgenstein interactions. See, for instance, Otto Neumaier, "A Wittgensteinian View of Artificial Intelligence" in *Artificial Intelligence: The Case Against*, ed. by R. Born (London: Croom-Helm, 1987); see, also, Andrew Hodges, *Alan Turing: The Enigma* (New York: Simon and Schuster, 1983). But, secondly, and most interestingly I believe, there are some of Wittgenstein's own writings that seem to

Wittgenstein) language game, the "imitation game", to replace the (what he sees as meaningless) question of "Can machines think?" Turing's "imitation game" includes a proposal to program a computer to play the role of a man attempting to imitate a woman; an intriguing proposal concerning the reproduction and representation of gender difference in computational, networked media. Turing's "imitation game" is usually re-named in the literature of AI as the "Turing Test" and re-narrated to exclude any mention of gender difference.[73]

Turing describes the imitation game like this: "It is played with three people, a man, a woman, and an interrogator who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. … It is [the man's] object in the game to try and cause [the interrogator] to make the wrong identification. … The object of the game for [the woman] is to help the interrogator. … We now ask the question, 'What will happen when a machine takes the part of [the man] in this game?' Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman? These questions replace our original [question], 'Can machines think?'" [74]

Within the literature of AI, discussions of Turing's imitation game have focused on the role of the machine and the role of the interrogator. The role of the woman has been almost entirely ignored. Yet, if one looks more closely at the woman's role in Turing's game, it is clear that variants of this role have been reiterated in popular art and performance for thousands of years. The woman's role, in Turing's game, is to compete with the machine for an identity which is properly hers to begin with (i.e., the role of "woman"). The frequently reiterated, popular fears surrounding AI and its cultural and specifically artistic precedents are the fears of this sort of role; i.e., the fears of loss of identity, fears of replacement by machine, fears of disfiguration, dismemberment, and death.

AI and Aesthetics of the Uncanny

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foreshadow by almost twenty years the approach Turing takes: *...This objection is expressed in the question: 'Could a machine think?' I shall talk about this at a later point, and now only refer you to an analogous question: 'Can a machine have a toothache?' You will certainly be inclined to say 'A machine can't have toothache.' All I will do now is to draw your attention to the use you have made of the word 'can' and ask you: 'Did you mean to say that all our past experience has shown that a machine never had a toothache?' The impossibility of which you speak is a logical one. The question is: What is the relation between thinking (or toothache) and the subject which thinks, has toothache, etc.?...* Ludwig Wittgenstein, *The Blue and Brown Books: Preliminary Studies for the "Philosophical Investigations"* (New York: Harper Torchbooks, 1958), 16. Thanks to Joseph Dumit for pointing out this passage of Wittgenstein's writings.

[73] Judith Genova, "Turing's Sexual Guessing Game" *Social Epistemology*, 8(4) (1994): 313-326; Warren Sack, "Painting Theory Machines," *Art and Design*, 48 (May 1996): 80-92.

[74] Turing, 433-434.

In short, these fears of an AI machine are, specifically, the fears of the "double" as it has been explored in psychoanalytic theory[75] and in the arts, for instance, in literature[76] and film.[77] More generally, these fears can be described as those associated with the *uncanny aesthetic* discussed by Sigmund Freud[78] and others.[79] Fears of the uncanny are often associated with machines, automata, and artificially produced "doubles."

Julia Kristeva has written that "uncanniness occurs when the boundaries between imagination and reality are erased."[80] Some AI researchers have tried to disavow association between their "real" work and the imaginative, artistic tradition that explores the fears of uncanny aesthetics.[81] Yet, any review of AI and aesthetics would certainly be incomplete without mentioning AI's relationship to the aesthetics of the uncanny because popular perception (e.g., as reflected in film, television, literature, and journalists' stories about AI) is often dominated by questions of "doubling:" Will machines replace people?

Limits of the Uncanny

A poststructuralist view of Kant provides a means of understanding some of the relationships between aesthetics and issues central to AI research (e.g., common sense and teleology). Newer offshoots of AI research tend to engage a larger variety of post-Kantian, philosophical, and critical vocabularies (e.g., those of Heideggarian phenomenology and psychoanalysis). Nevertheless, while newer work might move AI outside the limits of a Kantian-inspired aesthetics, the newer work is *not* independent of a larger discourse of aesthetics that includes issues beyond the beautiful and the sublime (e.g., the uncanny).

In fact, the above exploration of the connections between the commonsensical and the aesthetic shows a number of dependencies between seemingly different approaches to designing (AI) software and hardware. The first set of

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[75] E.g., Otto Rank, *The Double: A Psychoanalytic Study*, translated by Harry Tucker, Jr. (Chapel Hill, NC: University of North Carolina Press, 1971).

[76] E.g., Ernst Theodor Amadeus Hoffmann, "The Sandman," in *Hoffmann's strange stories*, translated by L. Burnham (Boston: Burnham Brothers, 1855).

[77] E.g., *The Student of Prague* written by Hanns Heinz Ewers and directed by Paul Wegener, 1912.

[78] Sigmund Freud, "The 'Uncanny'," in *The Standard Edition of the Complete Psychological Works of Sigmund Freud, Volume XVII*, translated by James Strachey. (London: Hogarth Press, 1919).

[79] E.g., Julia Kristeva, *Strangers to Ourselves*, translated by Leon S. Roudiez (New York: Columbia University Press, 1991); Anthony Vidler, *The architectural uncanny: essays in the modern unhomely* (Cambridge, MA: MIT Press, 1992).

[80] Kristeva, 188.

[81] E.g., Patrick Hayes and Kenneth Ford, "Turing Test Considered Harmful," in *Proceedings of the International Joint Conference on Artificial Intelligence* (Los Altos, CA: Morgan Kaufmann Publishers, 1995), 972-977 (976).

technologies discussed are based upon the assumption that commonsense can be coded, articulated, stated, or at least reasoned about prior to the use of the technology. "User friendly" software presumes a set of associations that are either coded into the software so that it behaves intelligently, or a set of associations that the user will make in trying to figure out and operate the software's interface. A second set of technologies – e.g., those of the so-called computational phenomenologists – are built with the aim that commonsensical behavior is negotiated between an agent and its environment. Thus, in this case, the associations of commonsense – e.g., Minsky's of example of how a suitcase, in certain circumstances, might be categorized as a something to stand on rather as a piece of luggage – emerge from a combination of what is perceived and what is known.

But, both the symbolic AI and computational phenomenologist perspectives assume that there does exist a set of associations (either *a priori* or negotiated) that can be labeled commonsensical. Likewise, so does the uncanny perspective on technology assume a background of the commonsensical. Art and design to produce an uncanny, alienating affect is an attempt to unravel the associations of the familiar and commonsensical. The Russian Formalist Viktor Shklovsky states that the purpose of art is to work against habitualization, familiarization, and automatization:

Habitualization devours works, clothes, furniture, one's wife, and the fear of war... art exists that one may recover the sensation of life; it exists to make one feel things, ... The technique of art is to make objects 'unfamiliar', to make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged.[82]

This approach to art, and the common popular presentation of AI technologies (e.g., in Hollywood films) as uncanny, attempts the exact opposite of the aims of user-friendly, commonsensical, "homey" (i.e., canny) design because it specifically makes the designed artifact unfriendly, unsettling, even scary.

But it is this very confrontation with social and political practice that the aesthetic theory of estrangement finds an apparently intractable and unyielding test. The formal and critical expression *of alienation, as the first avant-gardes found to their chagrin, does not always neatly correspond to the work of transforming or even ameliorating such conditions in practice. Formal explorations of defamiliarization based on carnivalesque reversals of aesthetic norms, substitutions of the grotesque for the sublime, the uncanny for the domestic, can all too easily be construed as decoration or caricature*.[83]

As Anthony Vidler's comment makes clear, even though this different kind of

[82] Viktor Shklovsky, "Art as Technique," in *Russian Formalist Criticism*, ed. by L.T. Lemon and M.J. Reis (Lincoln, NE: University of Nebraska Press, 1965), 11-12.
[83] Vidler, 12-13.

design is intended to produce scary, unsettling artifacts, sometimes it just produces silly kitsch. Ironically, these aesthetic failures might have the same flaw as the unworkable technologies that were suppose to be immediately recognizable as familiar and user-friendly: it is impossible to determine what, for all people in all circumstances, will be interpreted to be familiar and commonsensical.

Network Aesthetics: After the Uncanny and the Commonsensical

Internet-based interactions are oftentimes electronic exchanges open to cross-cultural and multi-cultural exchanges. Consequently, a design practice that assumes that the commonsense of Internet participants can be predicted and/or pre-enumerated is an untenable approach. The bulk of this chapter has been devoted to an illustration of how previous software design approaches (especially those of AI) are closely tied to a *commonsense aesthetics*, i.e., an aesthetics that presumes a commonsense, a predictably emergent commonsense, or the uncanny, interference of the commonsense world. An alternative to these approaches must be found if we are to design for the Internet where a potential, or virtual, commonsense is contingent upon the possible (but not necessarily probably) emergence of a community of people who create their own stable linguistic and social structure through continued interaction on the Internet. This new aesthetics, therefore, must be useful for the practices of designing for emergent communities.[84]

I am especially concerned with conversational interactions because Internet communities are usually founded on email exchange, chat, weblogging activities or other networked-based forms of conversation. I call these networked conversations very large-scale conversations (VLSC)[85] because they are often a form of conversation that involves many more people in far more complicated social and semantic dynamics than earlier forms of conversation and dialectic.

The term "dialectic" originates from the Greek expression for the art of conversation.[86]

It is worth remembering that a variety of aesthetic practices from art and design have been dependent upon an understanding of conversation or, more particularly, an understanding of dialectics. The conviction that the commonsense and stereotypes of mainstream media can be challenged through

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[84] These emergent communities might, in the lexicon of Gilles Deleuze and Félix Guartarri, be called "minorities." See Gilles Deleuze and Félix Guartarri, *A thousand plateaus: capitalism and schizophrenia*, translated by Brian Massumi (London: Athlone Press, 1988), 469-471.

[85] Warren Sack, "What does a very large-scale conversation look like?", in *Leonardo: Journal of the International Society for Arts, Sciences, and Technology*, Vol. 35, Issue 4 - August 2002: 417-426 (Cambridge, MA: MIT Press, 2002)

[86] Paul Edwards (editor-in-chief) "Dialectics," in *Encyclopedia of Philosophy, Volume 2* (New York: The Macmillan Company and The Free Press, 1967), 385.

design of new media has been the foundation for many philosophical and artistic-design projects produced to find new material forms for some recent theory of dialectics. At least since Socrates' time, artists, designers, and philosophers have been inventing new dialectical processes to unravel the forms of each new medium and each new commonsense. New theories of dialectics were developed by Plato, Aristotle, Immanuel Kant, Georg Wilhelm Freidrich Hegel, Karl Marx, Theodor Adorno, and others. Artists and designers have elaborated these dialectical processes for new and existing media. For example, a variety of artistic processes were developed in the early-twentieth century that can be seen as media-specific instantiations of Marx's theory of dialectics.[87] Among these processes might be mentioned Sergei Eisenstein's then-new techniques of editing and film *montage*.[88] Eisenstein's frequent collaborator[89], the Russian Formalist Viktor Shklovsky, described a set of devices used in poetry for making the unconscious conscious by making the familiar strange.[90] Shklovsky's notion of "making strange" (*ostranenie*) with poetry is comparable to Bertolt Brecht's theory of the "estrangement-effect"[91] (*Verfremdung*) in epic theater.[92] Analogous phenomena and devices – called *faktura*[93] -- were researched by the Russian Constructivists for media as diverse as architecture, painting, sculpture, and collage.

But, each of the artistic design practices mentioned differs according to the medium in which it was practiced and according to the theory of dialectics – or conversation – that it incorporated or made into material form. Obviously, as soon as conversation becomes something completely different, the aesthetics of a "dialectic" practice must also renew itself. The question is, therefore, what is the new aesthetics for interpersonal interactions on the Internet?

Dialectics has always been a form of conversational interaction, but also a procedure for division or repeated logical analysis of genera into species. For all intents and purposes this activity, the division of objects into kinds and their

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[87] See, for instance, Karl Marx, "Critique of Hegel's Dialectic and General Philosophy," in *Karl Marx: Early Writings* (New York: McGraw-Hill, 1983), 379-400.

[88] Sergei Eisenstein, *Film form; essays in film theory*, ed. and tr. by Jay Leyda (New York, Harcourt, Brace, 1949).

[89] See Fredric Jameson, *The Prison-House of Language: a critical account of structuralism and Russian formalism* (Princeton, NJ: Princeton University Press, 1972), 61.

[90] Victor Erlich, *Russian formalism: history, doctrine, 3rd edition* (New Haven: Yale University Press, 1965).

[91] Jameson, 58.

[92] Bertolt Brecht, *Brecht on theatre: The development of an aesthetic*, edited and translated by John Willett (New York: Hill and Wang, 1964), 70-71.

[93] "The Russian term 'faktura' literally means texture but this is inadequate to convey the ideological and artistic overtones which it carries in Russian. Faktura suggests the working of the surface of materials." From Christina Lodder, *Russian Constructivism* (New Haven: Yale University Press, 1983), 280, ff. 64. See also, Benjamin Buchloh, "From Faktura to Factography," *October*, 30 (Fall 1984).

ordering is one of the main activities of computer sciences, especially that area of computer science that concerns the construction of databases. Thus, the recent approach to, what she calls, *database aesthetics* outlined by the artist and designer Victoria Vesna is one vision of a new form for dialectical aesthetics:

Artists working with the net are essentially concerned with the creation of a new type of aesthetic that involves not only a visual representation, but invisible aspects of organization, retrieval, and navigation as well. Data is the raw form that is shaped and used to build architectures of knowledge exchange and as an active commentary on the environment it depends on – the vast, intricate network with its many faces.[94]

I agree with Vesna, but think that two aspects of her proposal need to be amplified and extended. Firstly, it is important to remember that data, especially, the data of interpersonal interaction on the Internet is never raw. It is always the end result of the writing or speaking activities of some participant in conjunction with a one or more "invisible" computation procedures of organization, retrieval, or navigation. Ever since the invention of things like social security numbers, the organization and indexing of databases has been about the organization and indexing of people as well as data. Like all dialectic, or conversational, processes, VLSC is a process in which people are organized. If a democratic design is pursued, then the VLSC can be about the self-organization, the self-governance of people. In Michel Foucault's terms it can be a *technology of the self* rather than a *technology of power*.

Secondly, the "invisible aspects of organization" are only invisible if design aesthetics adopts a point of view that puts those aspects over the "horizon line" of vision or inspection. In other words, I think a new aesthetics of conversation must have an affinity with many of the older dialectically-motivated aesthetics insofar as they were attempts to make the invisible visible.

To mark these amendments to Vesna's proposal I will refer to this new aesthetics as a *network aesthetics* to emphasize the focus of such an approach. The focus should be to show the production and reproduction of connections and associations between people and data and their interminglings (in, for example, the form of a *social cohesion*, or the emergence of a commonsense or shared set of metaphors or definitions).

There is a well-worked out philosophy of what I am calling network aesthetics. It is the descriptions of rhizomes, networks, desiring machines, and intensities articulated by Gilles Deleuze and Félix Guattari.[95] However, it is difficult to

[94] Victoria Vesna, "Database Aesthetics: Of Containers, Chronofiles, Time Capsules, Xanadu, Alexandria and the World Brain" *Journal of Artificial Intelligence and Society* (Fall 1999).

[95] E.g., Gilles Deleuze and Félix Guartarri, *A thousand plateaus: capitalism and schizophrenia*, translated by Brian Massumi (London: Athlone Press, 1988). Gilles Deleuze and Félix Guattari, *Anti-Oedipus: capitalism and schizophrenia*, translated by

articulate that philosophical approach to aesthetics when the domain of analysis is the new media technologies of information processing machines and networks (rather than, for example, older media like painting, architecture, or film). Deleuze and Guattari's lexicon was largely influenced by the vocabularies of non-linear system dynamics, cybernetics, and other technical artifacts that now need to be redesigned with this new aesthetics. In short, it is hard to distinguish the figure from the ground and many people, even the experts in this philosophical lexicon, fail to distinguish the vocabulary from the domain of analysis.

Various writers have noted a convergence between Deleuze's work and the scientific theories of complexity and chaos (developed in fields like physics and computer science). Brian Massumi, the English-language translator of Deleuze and Guattari's book *Thousand Plateaus*, said the following in a recent article:

[Gilles Deleuze's] work ... could profitably be read together with recent theories of complexity and chaos. It is a question of emergence, which is precisely the focus of the various science-derived theories which converge around the notion of self-organization (the spontaneous production of a level of reality having its own rules of formation and order of connection).[96]

Manuel De Landa, in his book *War in the Age of Intelligent Machines* meticulously expounds on how Deleuze's work intersects with theories of complexity, chaos and self-organization.[97] Indeed, Deleuze emphasizes his own mathematical and scientific "borrowings" in such work as chapter 15 of his book *Logic of Sense*.[98]

Conclusions

Rather than presume a sort of commonsense aesthetics to design for the Internet, a new approach must be developed. This is true because Internet is meant to be multi-cultural and cross-cultural in composition, so there is no one commonsense that can be identified *a priori*. Instead, the new approach must be based on the understanding that communities can emerge through network

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Robert Hurley, Mark Seem, and Helen R. Lane (Minneapolis: University of Minnesota Press, 1983). Gilles Deleuze, *Cinema 1: The movement-image*, translated by Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1986). Gilles Deleuze, *Cinema 2: The time-image*, translated by Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1986). Félix Guattari, *Chaosmosis: An Ethico-Aesthetic Paradigm*, translated by Paul Bains and Julian Pefanis (Bloomington, IN: Indiana University Press, 1995).

[96] Brian Massumi "The Autonomy of Affect" *Cultural Critique* (The Politics of Systems and Environments, Part II), 31 (Fall 1995), 93.

[97] Manuel De Landa *War in the Age of Intelligent Machines* (New York: Zone Books, 1991), 234-237

[98] Gilles Deleuze *Logic of Sense,* translated by Mark Lester and edited by Constantin V. Boundas (New York: Columbia University Press, 1990), chapter 15.

technologies and so new social and semantic relationships can be produced, reproduced, and transformed. It is possible to visualize these emerging communities and linguistic possibilities as the growth and change of networks or rhizomes.

But, to visualize them as such is problematic or at least overdetermined today. When one thinks today of, for instance, "network" is it not that the Internet itself forces all other ideas of networks out of one's head? Obviously, this is not the case for everyone, but for the many for whom this is the case, the quick association between any mention of network and the Internet creates a problem for a *network aesthetics*. How can network aesthetics be a new vocabulary for the design of network technologies if the vocabulary is immediately conflated with the object of study and design?

Perhaps, this concern for a more abstract theoretical language to describe a more material design practice is simply another misplaced nostalgia for an older kind of aesthetics. John Rajchman puts this counter into play:

What is then abstract? Today the question arises in relation to what is known as the "information" age. Perhaps some new pragmatist will apply the critique of abstractions found in Bergson and James to the very idea of information and the computational paradigm to which it belongs. Two related postulates might be distinguished. The first says that information is independent of the material medium through which it is transmitted; the second says that simulation and reality come to the same thing. Thus one "abstracts" from material support and, by replicating processes, abstracts them from the particularities of their real existence; even "life" becomes only abstract information, which can be replicated and so made artificially. The two postulates of immateriality and irreality then combine in the great conceit of the info era: that electronic devices will abolish real or material space and time and transport us all into another abstract, bodiless "space" or "reality," consummating the triumph of silicon over carbon.
By contrast in Deleuze one finds an abstraction concerned not with extracting information from things (as though the material world were so much clumsy hardware) but rather with finding within things the delicate, complicated abstract virtualities of other things. Such abstractions doesn't entail independence or transferability from material support and doesn't operate according to a logic of simulation. Rather inherent in materials it supposes the subsistence of connections that exceed the messages of a medium and ourselves as senders and receivers of them.[99]

So, to summarize, an aesthetics for the Internet needs to focus on producing the means for visualizing and understanding how social and semantic relations intertwine and communities and commonsense emerge. It may be the case that the theory and the phenomena of these kinds of self-organizational productions

[99] John Rajchman, "What is Abstraction?," in *Constructions* (Cambridge, MA: MIT Press, 1998), 73.

and reproductions are both network-based and, thus, conceptually and materially, mutually recursive in definition; an unsettling but perhaps workable perspective.