HAYEK: COGNITIVE SCIENTIST *AVANT LA LETTRE*

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ABSTRACT

This paper conceives of Hayek's overall project as presenting a theory of sociocognition, explication of which has a two-fold purpose: (1) to locate Hayek within the non-Cartesian tradition of cognitive science, and (2) to show how Hayek's philosophical psychology infuses his social theory.

PROLOGUE

> It is probably no more justified to claim that thinking man has created his culture than that culture created his reason (Hayek, 1952/1979, p. 155).[1]

For Hayek, intelligence is manifest through a reciprocal coalition with the artifactual (social and physical), a causal integration that can take ontogenetic, phylogenetic, individual, collective, cultural, or biological forms. Hayek's abiding insight was to emphasize the cybernetic loop of agent ← → environment ← → agent ← → environment through a perennial and mutual process of modification and conditioning; a reciprocal relation between our conceptual creativity and the environment, to intimate, regulate, and inform concepts and action (Hayek, 1988, p. 9). Mind does not merely respond to a *given* world, mind is *enacted* through a particularized history of environmental coupling: perception is an *act* of

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interpretation and the generation of meaning. For the Hayek agent, to know is to cognize, and to cognize is to be a culturally bounded, rationality-bounded, and environmentally located agent. Knowledge and cognition are thus dual aspects of human sociality.

The notion of the "enactive" mind broadly connotes what I've termed the DEEDS wing of cognitive science (Marsh, 2005b, 2006); a loose and internally fluid philosophical and empirical coalition, bound by a non-Cartesian sensibility, and comprising the Dynamical, Embodied, Extended, Distributed, and Situated approaches to knowledge and cognition. Readers should not get too bogged down in the terminology – there is not much stability in the assignations that comprise the acronym DEEDS. "Enactive" coined by Varela, Thompson, and Rosch (1991/2000), conceives of DEEDS as having overlapping concerns; a family resemblance term. Jaegher and Ezequiel (2007, p. 487) detect five mutually supporting concepts: autonomy, sense-making, embodiment, emergence, and experience. Others prefer the term "situated," which is taken to be the species: the other assignations, the genera (Robbins & Aydede, 2008). The enactivist stance is a naturalistic nonreductive view of mind as embodied and embedded, giving due emphasis to biological autonomy and lived subjectivity (Froese & Ziemke, 2009). Of particular interest in the current context is its incorporation of the organismic roots of autonomous agency and sense-making into its theoretical framework (e.g., Weber & Varela, 2002; Di Paolo, 2005). It's high time that AU :1 the multidisciplinary hub that is cognitive science admit Hayek into the pantheon of non-Cartesian thinkers, taking his place alongside 20th century titans such as Dewey, the later Wittgenstein, Heidegger, Vygotsky, and Merleau-Ponty. To this list, we might add more recent theorists such as Varela, Hutchins, Clark, Wilson and (Gregory) McCulloch, each sources of inspiration for much of the discussion that follows.

By contrast with DEEDS (or situated cognition), orthodox cognitive science has systematically overlooked *not* only the location of thinkers in their geophysical environments, but has also overlooked the interactions *among* thinkers in the ambient social soup. As a DEEDS theorist, Hayek negotiates the extreme polarity of an abstract individualism (or internalism) and an externalism associated with sociological theorizing that posits an inflated social ontology that makes no concessions to the mechanics of the mind and *individualized* learning patterns (Turner, 2007, p. 358). Generically speaking, externalism is the thesis an individual's environment has some causal determinant on the content of the individual mind. If there were a slogan that I believe captures the Hayekian project it is this: Hayek "*socializes*" *the mind and* "*cognitivizes*" *the social theory*.

Writing some 20 years *before* the term "cognitive science" had been coined, Hayek very perceptively understood that a multidisciplinary approach (psychology, physiology, logic, mathematics, physics, philosophy)[2] to explaining consciousness was called for (Hayek, 1952/1976, vii). In the service of addressing Hayek's neglect by cognitive science, two couplets of questions should be kept in mind:

1(a) Is Hayek's philosophy of mind anachronistic because he was writing long before the relevant options (i.e., the connectionist vs. the computational model) had been adequately defined? and/or

1(b) Have Hayek's defenders (Weimer & Palermo, 1974, p. 436) been *too* charitable since he does not offer anything precise enough to fit any of the current models?

The second, and more interesting, couplet seeks to assess Hayek's philosophy of mind in the context of his social philosophy:

2(a) Does his connectionist theory of mind *entail* the connectionist model of society?, or

2(b) Does Hayek's connectionist model of society *presuppose* the connectionist theory of mind?

This paper's primary task is to expand upon 2(a and b), an aspect that others (with the exception of McQuade and Butos) have only hinted at. The reader will be relieved that, in what follows, I desist from presenting "yet another summary of *The Sensory Order*" (Butos & Koppl, 2007, p. 20). Happily, now there are some fine substantive accounts, each emphasizing one or more of the many facets of *The Sensory Order* (Herrmann-Pillath, 1992; Streit, 1993; Tuerck, 1995; Smith, 1997; Birner, 1995, 1996; Boettke & Subrick, 2002; Steele, 2002; Loasby, 2004; Caldwell, 2004b; Novak, 2005; Feser, 2006). An example of a commentator that ostensibly has Hayek's "cognitive view of society" as a central concern, yet nevertheless does not refer to *The Sensory Order*, is Kerstenetzky (2000). In the service of bringing Hayek to the attention of the DEEDS wing of cognitive science, I show how canonical Hayekian themes such as cognitive closure, decentralization, situatedness, self-organization, and environmental appropriation are derived from his concern about complexity. The Hayekian corpus is an intricate weave of the epistemological, the methodological, and the metaphysical. Though *The Sensory Order* is the focal point to the discussion, to absolve oneself of any consideration of Hayek's other works, would be to mutilate Hayek, Hayek being subject to the grossest of caricatures over the years by both supporters *and* detractors. Regarding the former category,

Caldwell (2004b, p. 5) rightly points out that given the scope and voluminosity of Hayek's writings and depending upon which part of his work is being trawled, this will account for which Hayek emerges. Though admired by Thatcher and Reagan, it is unlikely that they read much beyond *The Road to Serfdom* and other highly selective readings refracted through others (in Thatcher's case, Keith Joseph; in Reagan's case, Martin Anderson and Paul Craig Roberts). Regarding the latter category, though the term "market" that has come to be synonymous with Hayek, he believed it to be a misnomer: he expresses his discomfort with the term because strictly speaking that is not what he's talking about (Hayek, 1978, p. 183, 1967, p. 164). Michael Oakeshott, arguably Hayek's closest intellectual ally, got Hayek plain wrong. Oakeshott (1962/1991, p. 26) famously took Hayek to task by pointing out that a doctrinal *laissez-faire* attitude is also a species of rationalism, rationalism of course being both Oakeshott's and Hayek's *bête noir* (Marsh, forthcoming a). Oakeshott's swipe is uncritically taken as a knock-down argument by several commentators (e.g., O'Hear, 1999; Lundström, 1992). Fortunately, Oakeshott's preeminent expositor acknowledges that an ascription of a vulgar atomism to Hayek is wrong (Fuller, 1989, p. 17). Hayek, explicitly and repeatedly, distanced himself from radical libertarianism as early as 1944 (Hayek, 1944/1976, pp. 17, 35, 36, 39, 42, 81; Hayek, 1973, pp. 61–62). Furthermore, for Hayek "Liberalism is not individualistic in the 'everybody for himself' sense" (Hayek, 1976, p. 151).

In the service of presenting a multidimensional Hayek, the binding agent to the discussion is his concern with complexity, Hayek's epistemological leitmotif – it is through this triangulation of mind, society, and complexity that Hayek gets his distinctive philosophical depth.

"Complexity," I contend, is *the* touchstone to Hayek's work. As Caldwell says: "By the 1960s Hayek was seeing complex orders everywhere" (Caldwell, 2000, p. 19; Hayek, 1988, p. 127; Fuster, 2003a, p. 7). "Complexity" is, however, one of those terms that are blithely bandied about: ontological and the epistemological interpretations of complexity tend to be conflated (McIntyre, 1998). Is our understanding a function of the *way that the world is* or a function of our *limitations in understanding* the way the world is? The latter, perspectival, was of course Hayek's concern. McIntyre (1998, p. 31) seems to think that Hayek equivocates between the epistemological and the ontological. I don't think this is the case at all. And this is as true for his social theory as it is for his philosophical psychology. There can be no doubt, the relation between complexity theory and Hayek's theory of spontaneous social order and social evolution is intimate (Vaughn, 1999b, p. 245; Caldwell, 2000, pp. 10, 13; 2004a, 2004b;

Gaus, 2006; also Birner, 1995). It has been suggested that Hayek's work was a precursor of modern complexity theory (Kilpatrick, 2001; Vaughn, 1999a, 1999b; Vaughn & Loren Poulson, 1998). This claim has some plausibility. One subarea of complexity research – multiagent modeling – has taken a great deal of inspiration from Hayek (Baum, 2004) and Vriend (Vriend, 2002; Kochugovindan & Vriend, 1998). Yet others draw upon Hayekian insights to resolve supply and demand issues in a distributed and dynamic web services network (Eymanna et al., 2005). Joita et al. (2007) deploy specialized algorithms to carry out a data mining tasks. Hayek's (1952, # 52) AU :4 writing here bears a striking resemblance to what is known as Particle Swarm Optimization, a social algorithm that runs on a sociocognitive model of social influence and learning (Kennedy, Eberhart, & Shi, 2001). Indeed, to take the embodied and situated agent seriously as Hayek did "is to invite an *emergentist* perspective on many key phenomena …" (Clark, 1997, p. 84). The Hayekian leitmotif of complexity turns upon:

1. How (if at all) can we come to characterize what mind actually is? (The first two drafts of *The Sensory Order* were entitled "What Is Mind?" (Kresge's introduction to Hayek, 1994/2008, p. 25)).
2. Is there a problem that can even be formulated?
3. Whatever mind may be, how does it apprehend the natural (and social) world of which it is fully a part (Hayek, 1952/1976, 1.11, 1.2, 8.45)?

These three interlinked concerns are coextensive with the most recent of enactivist concerns: "What are minds, and how do they relate – epistemically and experientially – to the world?" (Torrance, 2006, pp. 358, 360).

Complexity for Hayek offers both *the fabric of possibility and of inherent constraint* – what I term "Hayek's paradox." On the one hand, agents within a *rich* (complex) social tapestry have their conceptual and behavioral possibilities tempered by the partial cognitive and epistemic access to the (complex) manifold that informs the ambient culture. On the other hand, mind is itself constitutionally (and terminally) constrained in fully understanding its own (complex) mechanics – a mind that is significantly constituted by its (complex) social environment. There is the view that many thought experiments that have driven post-War philosophy of mind assume "a naive commitment to the principle that conscious beings must be simple" (Barnett, 2008). The paradox is this: knowledge can become *less incomplete only if it becomes more dispersed* (Loasby, 2004, p. ?). Epistemic and AU :5 cognitive efficiencies, well beyond the capacity of any one mind, are facilitated through the ubiquity of *sociocultural scaffolding* and dynamic

looping (Hayek, 1967, pp. 34, 42). This is the essence of Hayek's externalism and sets the stage for the discussion that follows.

HAYEK'S *PROTO*-CONNECTIONISM

> The large brain, like large government, may not be able to do simple things in a simple way (Hebb, 1958). AU :6

There is a delicious irony in Dennett's use of this quote: the analogy with big government couldn't be more Hayekian! (Dennett 1991, p. 209). AU :7 Complexity, for Hayek, arises from not only what David Chalmers (1995, p. 200) has famously termed the "hard problem" of consciousness, but also from the compounded problem of mind in an ambient dynamic sociality. The "hard" problem concerns the experiential, "felt" aspect to consciousness – in other words, the mind–body problem manifest as cognitive closure, which will be examined in the next section. The corresponding "easy" problems on Chalmers' account are "easy" because they address cognitive abilities and functions amenable to scientific study. (The "easy" problems might well take hundreds of years to be adequately explained). Hayek's task in *The Sensory Order* is, for the most part, concerned with the "easy" problems because as we will see, the hard problem, for Hayek, is forever intractable. *The Sensory Order* (6.4) is concerned with a subset of the easy AU :8 problems on Chalmers' list (p. 200), namely:

(1) the ability to discriminate, categorize, and react to environmental stimuli, and
(2) the integration of information by a cognitive system.

(1) Discrimination, categorization, and reaction to environmental stimuli

As early as 1920 (Hayek, 1920/1991), Hayek expressed a deep dissatisfaction with the realist myth of the self-differentiating object and the notion of raw datum posited by empiricism. Experience involves both perception and thought, anticipating what Wilfrid Sellars, (1956) would years later call the "Myth of the Given" (and more recently in McDowell, 1994/2000). Experience requires, not just the capacity for sensory awareness stressed by Locke and Hume, but also the capacity to make judgments about what one is aware of: in the current argot, observation is theory-laden (Hayek, 1952/1976, 2.15, 5.19, 6.36–37, 8.4–5, 8.7, 8.10, 8.14, 1952/1979, p. 105; Caldwell, 2004b, p. 277). John Gray (1980, 1984) has stressed Hayek's AU :9 "skeptical Kantianism," the idea being that though the mind is inherently a

pattern seeker in an undifferentiated metaphysical world (Hayek, 1967, p. 27; Edelman, 1987, pp. 7–8), this structure is itself subject to evolutionary malleability through the idiosyncratic factors of personality, culture, situation, and infinitely fine-grained permutations of other circumstances and considerations (Hayek, 1967, p. 76, 1952/1979, pp. 136–37, 1988, pp. 25, 76; Connin, 1990; Gick & Gick, 2001; Posner, 2007). In contradistinction to Gray, I prefer to call Hayek a "conceptual realist" on the grounds that the mind constructs a reality that impinges upon mind (Wiggins, 2001). Wiggins nicely captures this idea in the slogan that "just as the size and mesh of a net determine, not what fish are in the sea, but which ones we shall catch" (2001, p. 152), so too are the concepts we bring to bear upon experience. This notion has resonance with the quote attributed to Hayek (though no specific work is cited): "Without a theory the facts are silent" (Keegan, 1993, p. 6). My reading of Hayek is that he most definitely sought to maintain the existence of the external world (Caldwell, 2004a, p. 274). By contrast, strong or radical constructivism insists that all facts (artefactual or natural) would cease to exist without the continued presence (and appropriate behavior) of human agents. In other words, there is no independent reality; this generates an unsustainable relativism (Marsh 2005a; Nooteboom, 2007, p. 138), something Hayek did *not* subscribe to (Hayek, 1952/1979, pp. 156–157, 1967, p. 124, 1978, p. 3). This said, one can see why it has been suggested that Hayek has had his "postmodern moment" (Boettke & Subrick, 2002, p. 58; Connin, 1990; Gick, 2003, p. 162; Caldwell, 2004b, p. 274, note 11). In *The Sensory Order* (8.92), Hayek dismisses the "sociology of scientific knowledge" movement, the heirs apparent to Marx and Manheim. All one need claim is that the cybernetic impact upon the brain has outstripped any adaptive alteration of the genetic code (Wexler, 2006, p. 4). Moreover, hand in hand with his "soft" Kantianism, Hayek rejects the Cartesian idea that underneath the innumerable layers of civilization, there exits a pristine, unvarnished notion of reason (Hayek, 1978, 1967, pp. 82–95). Hayek's conceptual realism chimes well with the enactive perspective in that enactivism gives due emphasis to the mind's categorization tendencies modified by individualized experience of environmental coupling (Varela et al., 1991/2000; Varela 1999, p. 13).

It's trivially true that agents need epistemic access to the world of objects they inhabit and negotiate: intelligent behavior is informationally sensitive (Hayek, 1952/1976, 4.8, 1978, p. 39). Hayek's discussion could also be seen, as Feser (2006, pp. 289–290) rightly points out, in terms of intentionality, a notion that has been at the center of the philosophy of mind for over a 100 years. Cast in terms of intentionality, Hayek is asking the question: how is it

that mental states have content or representational character? Neural states must in some way be the bearers of semantic and informational content that hopefully (for the most part) has pragmatic truth-value.

Hayek and Hebb's models run on the idea that various cognitive activities are represented by combinations of the firing patterns of individual neurons with memory and learning arising from activity-dependent changes at individual synapses. Changes resulting from a particular pattern of neural activity enhance subsequent instances of that activity pattern (Hayek, 1978, pp. 42–43, 1976, p. 11, 1973, pp. 29–33, 1967, p. 57). For Edelman, these models confront empirical difficulties, namely that such firing is neither necessary nor sufficient for modification (Edelman, 1987, p. 181). Fuster (1995/1999, pp. 89–90, 2003a, 2003b) is of the view that Hayek's knowledge AU :10 of neural processes was sketchy (Hayek, 1952/1976, 3.1–3.24), *but* that it's incoherent to suggest that it could have been otherwise! Hayek's model does not posit a basic representational element, what in current parlance, is called the "feature detector" or the "submodule" or the "semantic symbol." Hayek denies that this is required: all sensory qualities are strictly relational at all levels. Taken thus, Fuster characterizes Hayek's model as *radically* connectionist in that it does not posit constraints at the neuronal level: it runs the risk of "connective explosion." This in contradistinction to a Cartesian "*binatorial* explosion," the idea that bottle-neck Cartesianism cannot deal with the complexity entailed by the situated agent (Wheeler, 2005, p. 181). In a personal communication, Fuster concedes that he may have exaggerated the risk of connective explosion. He writes:

> This only happens in epilepsy. The connectivity away from an active focus of sensation, or memory, decreases rapidly and nonlinearly as a function of two factors: (a) decreasing density of connections, and (b) decreasing synaptic strength. So, even though everything is potentially connected to everything else (a good thing for rehabilitation and alternate retrieval), this does not make the brain subject to fits. Then we are protected by GABA, and negative feedbacks of all kinds." (GABA is the acronym for "γ-aminobutyric acid" neurons).

But Fuster is adamant; whatever *The Sensory Order*'s fine-grained failings, it does not invalidate the general characteristics of a connectionist model or as Hayek would put it the "explanation of the principle." Explanation of the principle as used by Hayek is a term of art and was first enunciated in *The Sensory Order* (Hayek, 1952/1976, p. viii, 1.101, 2.18; 8.57–8.92, 1952, ♯6; and later in 1967, pp. 11–12, 20, 40, 1994, pp. 138, 154). By explanation of the principle Hayek meant that he sought in *The Sensory Order* to flesh out what he'd already started in Hayek (1920) – that is, to provide a scientifically plausible explanation, a *general characterization*

(a schema – Hayek, 1952, p. 6) for a range of phenomena, for the problem of consciousness – whatever the fine-grained physiological detail may turn out to be (Hayek, 1952/1976, viii, 1967, pp. 20–21; Fuster, 2004, 2006). In this sense, Hayek is providing guidance for what seems a promising line of first-order research. This is precisely what Rosenblatt takes to be the value of *The Sensory Order*: a suggestion of what to look for and investigate, rather than as a finished theoretical system in its own right (Rosenblatt, 1958, p. 388). *The Sensory Order* was a work of high-level theory with a limited empirical basis even though Hayek had, 30 years earlier, spent time in the Zurich laboratory of Russian–Swiss neuropathologist Constantin von Monakow, tracing fiber bundles through different parts of the brain (Hayek 1994/2008, p. 64; Caldwell, 2004b, p. 136)). *The Sensory Order* is necessarily incomplete (Fuster, 1995, p. 89, 2003a, p. 1048, 2006b, p. 126; Başar & Karakaş, 2006). Hence, I have characterized *The Sensory Order* as a work in *philosophical* psychology – a treatise on the *explanation of the principle* as relates to the mind–body problem *and* the problem of mental representation.

If the typical features of connectionism are its relational character, it's categorical and hierarchical character, its wide-ranging scope of categorization, and its dynamic interaction between perception and memory, then the model *The Sensory Order* recommends is well and truly connectionist. Fuster makes the bold claim that "Hayek's model comes closer, in some respects, to being neurophysiologically verifiable than those models developed 50–60 years after his" (Fuster, 1995/1999, p. 89). That Hayek (1920/1991) presents a recognizably, albeit tentative connectionist-like or cortical network theory, undermines the claim that the *earliest* progenitors of connectionism were McCulloch and Pitts (1943). Fuster (1995/1999, p. x, see also 2003a, 2003b, pp. 7, 60) writes that Hayek was "in my opinion the first and unrecognized pioneer of cortical network theory." Of course, Hayek's model lacks the fine-grained neurophysiological–mathematical logic sophistication of McCulloch and Pitts – I reiterate: the nature of Hayek's project was of a different character – it was an *explanation of the principle*.

(2) The integration of information by a cognitive system

The link between mind and epistemology was made as early as 1920 when Hayek served notice that his "linkage" theory of apperception was no less than a naturalistic attempt to explain consciousness with the expectation that epistemology itself would be profoundly impacted. Hayek made good on this promissory 30 years later through his assimilation of Gilbert Ryle's "knowing how/knowing that" (KH/KT) distinction (Hayek, 1952/1976,

I.57, 2.7, 1.55, 8.42, 1988, pp. 78–79).[3] As Hutto (2005) points out the fault line between traditional cognitivist and enactivist paradigms is determined by their respective commitments to understanding cognition as based on KT versus KH.[4] The KH/KT distinction profoundly informs that Hayek's social theorizing most famously manifest in his critique of the rationalistic tendency inherent in central planning – society is just too complex, has too many variables, local and ephemeral, to offer a predictive science of politics and economics. For Hayek, the greater part of social knowledge (habitas, skills, mores, traditions, "forms of life," and practices – KH) cannot (without remainder) be stated propositionally (Hayek, 1973, p. 11, 1944, p. 14, 1948, p. 155, 1978, p. 8) since it is dispersed across multiple minds in a constantly shifting environment. This dispersion of social knowledge is what Clark calls the "spreading of epistemic credit" (Clark, 1997, p. 69). AU :11

Another way of casting the notion of KH/KT complexity is in terms of the "frame problem." Boettke and Subrick (2002) see a similarity between Searle's (1984, pp. 28–41) Chinese Room thought experiment and Hayek's critique of central planning. Searle's argument, sloganized as "syntax is not sufficient for semantics," is designed to show that whatever purely formal principles one puts into a computer, they will not be sufficient for real understanding. For Hayek, centralized planning necessarily abstracts from fine-grained worldly experience of local conditions. The common denominator Boettke and Subrick point to is that for both Searle and Hayek interaction with the real world is essential for understanding and intentionality or, as Boettke and Subrick put it, "the argument leads directly to an emphasis on the tacit domain and the contextual nature of knowledge" (2002, p. 56). After almost 30 years of discussion, there is no consensus as to what Searle's thought experiment illustrates. McGinn (1991, p. 211) for one, pointedly says that all that Searle has shown is that semantic properties cannot be had in virtue of the rules of the program. I think that a deeper point emanates from the Heidegger–Dreyfus holism Boettke and Subrick allude to – the infinite richness of everyday experience is a well-honed expertise manifest as a kind of pattern recognition ability, rather than from explicit inferential capacities.

Though the KH/KT distinction is taken to be primarily an epistemological distinction, is as much a claim about the operations of the mind (Hayek, 1952/1976, 2.7). Day-to-day life is one of situated agents perpetually responding to and redefining their environment without having recourse to an explicit range of alternatives. For Hayek abstract rules of which we are *not aware* determine the sensory world presented as conscious experience. In *The Sensory Order*, 6.15 (and 6.22–6.28), Hayek talks of the

"narrowness of the consciousness"; that any one time only a limited range of experience is presented as consciousness. Dennett terms this the "fame in the brain" or "political power" or clout metaphor for consciousness (Dennett, 2005, pp. 136–138, 142), the idea being that a theory of consciousness would need to explain how some relatively few contents become elevated to a position of political power (consciousness). Conscious experience is only a part, or the result, of processes of which we cannot be conscious (Hayek, 1952/1976, 5.55, 5.9, 6.1, 6.3, 6.12). It is only through the super-structure, which assigns to a particular event a determined place in a comprehensive order, that makes it a conscious event (Hayek, 1952/1976, 5.31, 5.55, 1978, pp. 45, 48, 1967, p. 61). For Ryle and Hayek, intelligent performances are not dependent on an antecedent theorizing or knowing. When one does something intelligently one is doing *one* thing and not two things (Hayek, 1978, p. 81, 1973, pp. 18–19, 1952/1976, 4.61). To be intelligent is not merely to satisfy criteria, but to *apply* them; to regulate one's actions and not merely to be well-regulated, even within the narrow constraints of a game or say an activity such as driving. The careful driver cannot plan for all possible contingencies (Hayek, 1978, p. 7, 1967, pp. 43–44). The driver's readiness to cope would reveal itself were an emergency to arise, but it is latently there even when nothing critical is happening (Hayek, 1978, pp. 10, 45, 84, 1976, p. 23). Intelligent conduct of serial operations does not entail that the agent is, throughout the progress of the operation, tracking what he or she has completed *and* with what remains to be done. The fine-grained detail and cognitive effort that would be required to undertake even the most banal of sensory-motor activities, let alone activities that are socially complex, would require a level cognitive resources that would (at best) be debilitating (Hayek, 1952, ♯21–31, 1976, p. 21, 1978, p. 46; Loasby, 2007, p. 1744). Rule-following, evolved through trial and error (Hayek, 1948/1980, p. 11, 1978, p. 81, 1967, p. 130, 1973, p. 43, 1988, pp. 20–21), offers "pre-packed knowledge modules" to reduce the cognitive load. From the enactive perspective, to express KH in terms of KT would be well nigh impossible: KH is the "very essence of *creative* cognition" and necessarily historical (Varela et al, 1991/2000, p. 148).

To constantly "theorize" each and every action, would constitute what Ryle termed the Cartesian myth requiring the positing of a "central theatre," some central place in the brain where something like an "I" or the "self" attends to and witnesses consciousness (Hayek, 1952/1976, 6.18; Klein, 1999, p. 70). The "I" partakes of both the private and the public realms: the identity of the "I" is, in effect, an emergent property of a complex distributed process mediated by social interactions (Varela, 1999,

p. 62). Positing a substantial private identity, a central authority or "homunculus," gives rise to "Ryle's regress": an observing self must necessarily contain another observing self, and so on *ad infinitum*. The combination of the assumptions that theorizing is the preeminent activity of minds and that it is a private operation, amounts to the postulation of a shadowy additional metaphysical entity – the dogma of the "ghost in the machine," Ryle's most famous catch-phrase (Ryle, 1949/1990; Hayek, 1952/1976, 1.91, 8.42). In these terms, the Cartesian abstraction is rendered as nonsense (Hayek, 1952/1979, p. 134). Homuncular explanation is redundant and this seems to be borne out by empirical research done by Fuster (2003b, 2008) on behavioral network dynamics (the perception–action cycle).

One can begin to appreciate the virtues of a connectionist-like model of mind that is posited for the Hayekian situated agent. A connectionist version of representation does not posit mind as a storehouse of representations – Ryle's the "intellectualist legend" (Hayek, 1952/1976, 5.11). Representation need not be thought of as internal copies or codes, but as an *activity* that individuals perform in harvesting and deploying knowledge by being embodied, environmentally situated and essentially coupled. (This, in contrast, with a symbolic representational system that "encourages" the bifurcation of cognition from its environment and body. It should be noted that the connectionist and the symbolic "paradigms" are not an either/or choice, there are many hybridized versions. Even Vygotsky's theory is seen as hybridized (Frawley, 1997)). But, as Fuster says: "Connectionism is a useful way of thinking about how, in principle, neural networks could develop and do their job in cognitive function, but it does not solve any specific neural problem" (Fuster, 2003a, 2003b, p. 10). Hayek's conception is an *exploitative* view of representation that is not simply reactive but *enactive*. It's a model that that allows us to go beyond our immediate environments to a past through memory, habit and tradition and forward through planning and imagination, neither requiring the direction from paradigmatic cognitive states such as beliefs and desires. This is not to deny the importance of deliberative and reflective thinking, but what needs to be appreciated is the role and relevance of these cognitive modes manifest in Hayek's critique of rationalism (Hayek, 1952/1979). Hayek's cognitive agent is *more* in tune or enmeshed with reality: a social *and* physical reality (Butos & Koppl, 2007, p. 39), consonant with the "conceptual realism" I suggested earlier.

Pinker (2002, p. 292) certainly makes the connection between Hayek's connectionism and his reliance on the KH/KT distinction. The contrast between rationalistic (propositional) knowledge and non-rationalistic (tacit)

knowledge is a distinction coextensive with what Pinker terms the Utopian Vision and the Tragic Vision; Hayek of course falling within the latter category.[5] Pinker is of the view that it's no coincidence that this distinction neatly maps onto the distinction between symbolic representation and distributed neural networks.

COGNITIVE CLOSURE

> If the human brain were so simple that we could understand it, we would be so simple that we couldn't (Pugh, c. 1938).[6]

A defining feature of Hayek's philosophical psychology is the notion of cognitive closure, an idea that is refracted through his social theory. Cognitive closure falls within the hard problem that was flagged in the last section. The "hard" problem concerns the experiential, "felt" aspect to consciousness – in other words, the mind–body problem.

Hayek admits that the mere conceptualization of the mind–body problem is slippery (Hayek, 1967, p. 22). Hayek's cognitive closure argument goes like this:

1. *Explanation* is delimited by the apparatus of classification[7] (the mind) (Hayek, 1952/1976, 8.67, 8.81) (premise 1). AU :12
2. An apparatus of classification cannot *explain* anything more complex than itself (Hayek, 1952/1976, 5.91, 8.26, 8.69, 8.80) (premise 2).
3. Therefore, the mind cannot fully *explain* itself (Hayek, 1952/1976, 8.91, 8.96, 8.98, 1952).

Hayek takes the view that a unified theory of consciousness (i.e., the hard *and* the easy problems) is forever beyond our grasp (Hayek, 1952/1976, 2.18, 8.88, 8.95). Our minds, constitutionally delimited, can only offer an explanation of consciousness that is condemned to *practical dualism* (Hayek, 1952/1976, 8.87); in effect, Hayek's position falls within what is known as neutral monism (Stubenberg, 2005). Hayek is acutely aware that self-referentiality leads to dead ends, the instrument of explanation simultaneously being the object of explanation cannot get us anywhere (Hayek, 1952/1976, 8.67; cf. Maturana & Varela, 1980, p. 49). Indeed, for Hayek "The whole idea of the mind explaining itself is a logical contradiction" (Hayek, 1952/1976, 8.91, 2.19; Hayek, 1967, pp. 34, 37, 39). This idea has resonance with the quote: "If you work on your mind with your mind, how can you avoid an immense confusion?," a Zen poem known as "Xinxinming" (Hsin Hsin Ming) traditionally attributed to Sengcan

(Seng-Ts'an).[8] Hayek takes this incompleteness – the constitutional inability of mind to explain itself – to be a generalized case of Gödel's Incompleteness Theorem (Hayek, 1982, p. 292, 1967, p. 62).[9]

Three related points need to be made. First, Hayek is *not* recommending a Cartesian dualism, but simply that despite the underlying physical basis of consciousness, all we really have to work with and through, is a folk psychology that posits two realms – the sensory order and the physical order. In other words, the everyday understanding of "belief and desire" is in contradistinction to a supposedly scientific understanding. Second, Hayek is through and through a naturalist, a position he has consistently held throughout his career (Hayek, 1920; Hayek, 1952/1976, 1:49, 1982). Hayek fully acknowledges that consciousness *is* a natural phenomenon, but determining what the precise relation of consciousness is to the physical world is constitutionally beyond mankind's ken (Hayek, 1952/1976, 1:11). Third, Hayek is *not* a naturalistic agnostic, that is, the view that science *currently* cannot offer an explanation of the mind–body relationship, but in principle it could.

Hayek's cognitive closure position has strong commonalities with Thomas Nagel, Frank Jackson, and Colin McGinn, their conclusions collected under the rubric of "new mysterianism" (Flanagan, 1984). New mysterianism connotes the idea that while naturalism is true, the human mind is terminally constrained in being able to explain itself – whatever we discover about the causal states of consciousness, there will still remain an "explanatory gap." Hayek has most in common with McGinn. On McGinn's account, we just have to accept what he terms as *cognitive closure*, that is, we need to appreciate that there are limits to our capacity to understand the world (McGinn, 1989, p. 7). McGinn's deflationary tack is that once one accepts the insolubility of the mind–body problem, then this problem dissolves. For McGinn (1989, p. 18), the philosophical view is no less immune to obfuscation than that of folk psychology, except that in the former, there is the assumption that the problem must be scientific. Philosophers of an eliminative materialist stripe depreciate what, is in fact, the richness of the human condition (McGinn, 1989, p. 22; Hayek, 1976, p. 127). Even those who are not out of sympathy with the Hayek–McGinn conclusion are concerned that although we might not be able to specify a solution, it is incoherent to suggest that we couldn't understand *what would count* as a solution (Kriegel, 2003, p. 184). And though Kriegel has McGinn in his sights, he would have to let Hayek off the hook if one allowed Hayek's *principle of the explanation* to be extended to all complex explanations. In this sense, Hayek, could without contradiction, say that "we have no clue

about consciousness, but at least we have a clue about why we have no clue'' (Kriegel, 2003, p. 188).

Hayek's discussion of the mind–body problem speaks directly to a topic that has dominated philosophy of mind for the past 35 years – *qualia* (*quale* for singular), a term of art that denotes this subjective ''felt'' quality to consciousness – the ''unexplained residue'' (Hayek, 1952/1976, 1.19, 8.85) that physicalism has failed to explain. Indeed, it has been said that, ''[t]he problem of consciousness is identical with the problem of qualia …'' (Searle, 1998, p. 28). Qualia-talk went into overdrive in response to an argument presented by Frank Jackson (1982).[10] Jackson's argument, known as the ''knowledge argument,'' was conveyed through a thought experiment that I've entitled ''Monochrome Mary.''

''Monochrome Mary'' poses the following question. What, if anything, would be experientially different for Mary on her release into a full color world given that she'd heretofore lived her whole life in a black and white world? Could she anticipate the experience *even though she was in possession of a complete physical description of reality*? Jackson concludes that Mary would still experience something new, in case of the thought experiment, the color red. One line of thought that challenges Jackson's argument involves an equivocation of ''know.'' Is Mary's new-found knowledge propositional or know-how/ability-type knowledge? For Hayek, *qualia* are know-how (Hayek, 1952/1976, 2.7). The Mary puzzle is intended to make for the view that *qualia* cannot be reduced to the level of physics and hence there cannot be a unified theory of consciousness. Dennett (1991) terms these thought experiments as an ''intuition pumps,'' a pejorative swipe at the a priorism he sees generated by them. Jackson, it should be noted, has since retracted his original conclusion; he is now of the view that the sensory side of psychology is, in principle, deducible from the world's physical nature.

Jackson's thought experiment bears a striking resemblance to Hayek's discussion in *The Sensory Order*, 1.95. Hayek took inspiration from C. D. Broad, the idea that an omnipotent being would still not be able to predict the *qualia* associated with a substance, for example, ammonia (Broad, 1925, p. 71). Here Hayek poses the question: how could one communicate the idea of vision generally and color in particular to the congenitally blind? In *The Sensory Order*, 1.97 and 1.98, Hayek cites physicist Kenneth Mees' thought experiment as illustrating the distinction between the physical and the phenomenal orders.[11] Mees asks us to consider the case of a congenially and totally deaf person confronted by someone playing a violin. Moreover, he asks us to suppose that this person knows nothing of sound *even* in a theoretical way. Confronted by the actions of the violin player, to the deaf

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person the actions will appear irrational. *But*, says Mees, if our deaf person *was* a scientist, he or she would eventually figure out that the movements of the violin bow generated vibrations that could be detected by equipment (the science of acoustics). Now whatever the issues Hayek has with Mees' example, his conclusion is this: "the congenitally blind or deaf can never learn *all* that which the seeing or hearing person owes to the direct experience of the sensory qualities in question, because no description can exhaust all the distinctions which are experienced" (Hayek, 1952/1976, 1.102). The similarity of the conclusion shared by Hayek and Jackson is uncanny.

Hayek's pessimism manifest in his discussion of cognitive closure and *qualia* marks a deep philosophical issue, that is, *the view that science is explanatorily closed* (Hayek, 1952/1976, 1.88, 8.31). Were Hayek an agnostic he would take the view that the ultimate explanations provided by science are in need of supplementation (Hayek, 1952/1976, 1:13; 8:26; 8:31; Hayek, 1952, ♯35). This is of course not the case. Science has failed miserably at assimilating the irreducible phenomenal aspect of conscious experience (Hayek, 1952/1979, p. 36) and will continue to do so. Humankind is forever condemned to a practical dualism.

HAYEK'S *SOCIAL* CONNECTIONISM

> The brain struggling to understand the brain is society trying to explain itself (Blakemore, 1977, p. 185).

This sentiment is echoed in (Hayek, 1952/1976, 1.17): "[M]uch that we believe to know about the external world is, in fact, knowledge about ourselves." Given the intimate tripartite nature of mind, knowledge and society, it is perfectly plausible for one to draw the inference that the connectionist paradigm in Hayek's philosophy of mind has a conceptual analog in the social sphere – hence this section, for the sake of parity, is entitled *social* connectionism. Under consideration first is the general claim of the link between mind and society in Hayek's work. This sets the scene for discussion of Hayek's social externalism.

Mind and Society

That Hayek's view of the mind and his view of the market have strong similarities and continuities has been noticed by many. Anyone who has

read most of the Hayek corpus must surely share this view (Weimer & Hayek, 1982; Boettke, 1990; Boettke & Subrick, 2002; Streit, 1993; Birner, 1995; Tuerck, 1995; Caldwell, 2000, 2004a; Horwitz, 2000; Gick & Gick, 2001; Mistri, 2002; Butos, 2003; Rizzello, 2004; Frantz, 2005; Gaus, 2006; Loasby, 2004; Novak, 2005; Butos & Koppl, 2007; McQuade, 2007; Gifford, 2007; Posner, 2005, 2007; Gick, 2003, forthcoming, unpublished a, unpublished b). Indeed, Hayek himself makes the connection: "It was concern with the logical character of social theory which forced me to re-examine systematically my ideas on theoretical psychology" (Hayek, 1952/1976, p. v) and again: "I chose economics, perhaps wrongly; the fascination of physiological psychology never quite left me" (Mahoney & Weimer, 1994; Hayek, 1978, p. 36). At the very least, Hayek's philosophical psychology was implicit in everything he ever wrote (Hayek 1994, pp. 139, 153). In 1948, he wrote that his 1920 essay was his most important intellectual accomplishment (Novak, 2005; Aimar, 2008, p. 25). Streit (1993, p. 227) goes so far as to say that Hayek, the polymath, "wanted to replace metaphysics with neurophysiology."

But is it plausible to suggest that Hayek's work contains a *systematic* answer to any connection? It all depends on how stringent one is in characterizing systemization. One recent commentator (Feser, 2006, pp. 287–288) marks this problem:

> That [*The Sensory Order*] foreshadowed connectionism seems at the end of the day a point of merely historical significance; and its status as the "foundation" for Hayek's economics and politics has, I think, been exaggerated, claims for such a status typically resting on little more than the fact that the book characterizes the mind just as Hayek characterized economics and social systems, namely, as being complex, dynamic and unpredictable in principle. (Hayek would no doubt have characterized the weather in exactly the same terms. Should we therefore regard meteorology as providing a "foundation" for his economics and politics?)[12]

Though Feser's argument is formally weak, a more charitable reading AU :14 reveals a fundamental oversight. In addition to mind being complex, dynamic, and unpredictable Feser misses the key idea of mind as an *adaptive classifying structure* necessarily embedded in a social world. It has to be admitted that even if Hayek had a proto-connectionist theory of mind, as I (and others, e.g., Fuster, 1995/1999) claim he definitely did, it does not follow that Hayek *logically* connected the mind with society. To be aware of an implicit connection isn't the same as drawing out that connection; to signal one's awareness of the connection in a late work isn't the same as one's awareness of it in earlier work (I allude here to the contested provenance of Hayek 1988 – see Caldwell (2000, pp. 17–18)). A case in

point: Edelman (1987) is listed in the bibliography, but is not even hinted at in the body of the discussion. To be sure, Hayek explicitly stops well short of identifying society as some sort of super-brain[13] (Hayek, 1967, p. 74, 1988, p. 98; Weimer & Hayek, 1982; Birner, 1995; Aimar, 2008, p. 41). *But*, it has to be conceded, Hayek's language does sometimes encourage this vision, notably the functionalism of *The Sensory Order* (Hayek, 1952/1976, 2.27–2.30, 5.75, 1988, p. 42). Functionalism in its most standard form is the idea that mind is only contingently dependent on the brain, the a priori implication being that a mind can be instantiated in any material. Hayek: "So long as the elements, whatever other properties they may possess, are capable of acting upon each other in the manner determining the structure of the machine, their other properties are irrelevant for our understanding of the machine" (Hayek, 1952/1976, 2.28). And again: "[A]lthough … machines cannot yet be described as brains, with regard to purposiveness they differ from a brain merely in degree and not in kind" (Hayek, 1952/1976, 5.75). Hayek's functionalism is puzzling and is hostage to a raft of objections of which I mention only two. First, it abstracts from the physical details of neurological implementation. This clearly undermines the Hayekian situated agent. Second, it ignores the experiential aspect to consciousness in that functionally identical persons could differ in their experiential states. Hayek's functionalism warrants a detailed discussion, something I'll defer for another time. Interestingly, Hayek's brief functionalist talk anticipates (by 8 years) Putnam's canonical formulation of functionalism (Putnam, 1975, p. 291). Feser (2001) offers a Hayek-inspired discussion of functionalism that accommodates *qualia*. This discussion seems to be an anomaly in Hayek.

The commonalities and disanalogies of mind and society in Hayek is a line of thought that has received its most sustained treatment from McQuade (2007), McQuade & Butos (2006) and Gifford (2009). Alert to Hayek's super-brain admonition, they wish to show that Hayek's theory of mind has analogs in the social domain. McQuade and Butos "do not think that people and neurons are comparable in any other sense than that they can form mutable interaction patterns with each other" (McQuade & Butos, 2006, p. 341; Wang & Sun, 2008).[14] Earlier they claim "their analogs are present, in different physical realizations, in various social systems" (McQuade & Butos, 2006, p. 336). I'm not convinced that McQuade & Butos are not (even unwittingly) smuggling in a form of functionalism: multiple realizability has traditionally been used in support of functionalism.

Putting aside my functionalist qualms, I'll go along with the idea that social systems are *brain-like* in that "the interactions between their

components implement a classifying process on stimuli impinging on the system, and this process can induce real changes in component behavior and interaction that, in turn, engender adaptive reactions of the system as a whole to changes in its environment'' (McQuade, 2007, p. 59; McQuade & Butos, 2006, p. 341). Indeed, it seems that Hayek does explicitly countenance this in *The Sensory Order*, 8.45:

> What we have tried to do here is to show that the same kind of regularities which we have learnt to discover in the world around us are in principle [*sic*] also capable of building up an order like that constituting our mind.

What's been emphasized by McQuade and Butos as the common denominator is emergence arising from interminable positive and negative feedback characteristic of adaptive systems.

Extended Cognitive Systems

I want to recast the McQuade–Butos line in different terms. First, as a case for Hayek's *externalism*; and second, as a case for adaptive systems to be viewed as specific form of externalism – an *enactive* form of externalism. Both jointly displaying the emergent, distributed and adaptive features McQuade and Butos are rightly keen to show can be found in the social domain.

It is hardly contentious that Hayek should be taken as an externalist. Hayek himself could not have put it more plainly (Hayek, 1952/1976, 8.1):

> If the account of the determination of mental qualities which we have given is correct, it would mean that the apparatus by means of which we learn about the external world is itself the product of a kind of experience. It is shaped by the conditions prevailing in the environment in which we live …

Externalism means different things to different people. A somewhat generic characterization is that it is the thesis that an individual's environment has *some* causal determinant on the content of the individual mind. Externalism provides Hayek with a way of avoiding what McCulloch (2003, pp. 5–9) calls the Demonic Dilemma. That is, do we locate intentionality on the mind side, thereby sealing it off from the world at large, or do we locate intentionality on the world side, thereby failing to explain how there could be any content or subjectivity on the mind side of things. Thus, the discussion of externalism connects with the earlier discussion on cognitive closure and qualia.

As mentioned at the outset of this paper, Hayek's externalism cuts across the various emphases and concerns of the "situated" literature: it speaks to a past and a recent conception. Adam Smith's (1776/1976) idea of the "division of labour" and Hayek's much broader systemic dispersion of knowledge are classic instantiations of the distribution of cognitive labor. Though never referring to Smith or Hayek, Edwin Hutchins' *Cognition in the Wild* (1995) restates important aspects of their insights. All divisions of labor, whether physical or cognitive in nature, simple or complex, involves the distribution of two kinds of cognitive labor – the cognition that is the task and the cognition that governs the coordination of the elements of the task (Hutchins, 1995, p. 176). Hayek's illustration of the distributed nature of cognition in *The Sensory Order* (4.40 and 4.41) bears more than a passing similarity to Hutchins' famous discussion of maritime navigation.

I wish to make a case for the view that society, in Hayek's theory of it, functions as a kind of *extra-neural memory store* – mind and society are relational in a highly qualified way. But first, a disclaimer. Following Adams and Aizawa (2008, pp. 106–132), I want to draw the distinction between an *extended cognitive system* and *extended cognitive process*. The former claims that brain, body, and environment constitute an extended system in the sense that an extended system *augments* cognitive processes. But it is quite a radical step to say that this processing literally *extends* into these artifacts. (The DEEDS literature is as contentious as it is suggestive and I make no claims here to be engaging with it critically. For a sustained critique of DEEDS, see Adams & Aizawa 2008 and Rupert 2009.) I don't see any grounds for labeling Hayek as an "extended mind" theorist in this sense. I make the claim that Hayek subscribes to the idea of an extended cognitive system without imputing actual cognitive processing to these structures: "the mark of the cognitive" (Adams & Aizawa, 2008, pp. 76–87) is for Hayek, very much internalist (Hayek, 1952/1976, 6.8–6.13).

Hayek's externalism rests on the view that extant and spontaneous arising customs, practices and traditions are the sources or *fundamentum* and the *residua* of practical reasoning: to disregard them is to be irrational (Hayek, 1948/1980, p. 24, 1952/1979, p. 163, 1960/1978, pp. 61–62, 1978, p. 18).[15] It's what Hayek terms the "*discipline* of reason" (Hayek, 1978, p. 19, 1973, p. 32, 1988, p. 8). And, whatever a tradition is, by definition, it cannot reside solely within an individual – there is no direct brain-to-brain/mind-to-mind memetic transmission – continuity can only be mediated albeit imperfectly through a web of social artifacts (Turner, 2003, pp. 3, 11). As (Millikan, 1993, p. 170) puts it: "I no more carry my complete cognitive systems around with me as I walk from place to place than I carry the US currency

system about with me when I walk with a dime in my pocket.'' For Hayek, knowledge and cognition must be set against a background fabric of cultural possibility: individuals draw their self-understanding from what is conceptually to hand in historically specific societies or civilizations, a *preexisting* complex web of linguistic, technological, social, political and institutional constraints (Hayek, 1973), a ''social ecosystem'' if you like (Gamble, 2006, p. 130).

Hayek is an ''enactive'' externalist in the sense that the Hayekian agent *cognitively offloads and harvests knowledge through external sociocultural structures*. This interpretation finds resonance in a recent paper by Gifford (2009). For Hayek, ''computational'' efficacy is enhanced by allowing information to remain outside the brain, and by thus exploiting environmental and social resources rather than having to encode *everything* relevant internally (Hayek, 1978, pp. 42–43, 1967, pp. 50–53). The mark of advanced cognition depends upon our ability to diffuse propositional (KT) and practical knowledge or wisdom (KH) through external epistemic and cognitive structures offloading the epistemic burden with a reciprocal and cybernetic ''enactive'' relation between our conceptual creativity and the environment, to intimate, regulate, and inform concepts and action (Hayek, 1973, p. 37; Fuster, 2008; Dupuy, 1994/2000). Organisms, such as ourselves, will appear self-adaptive and purposive and ''will in general be 'active' in the sense that what at any given moment will determine the character of its operation will be the pre-existing state of its internal processes as much as the external influences acting on it'' (Hayek, 1952/1976, 5.65).

The perpetual feedforward and feedback (Hayek, 1952/1976, 2.25, 4.54, 4.9) that is characteristic of the enactive mind undermines the stark polarities of methodological individualism[16] and social holism, which respectively generate the idealized pernicious fictions of the ''unencumbered'' self and the anthropomorphic society (Hayek, 1988, p. 113; Caldwell, 2004a, pp. 279–287). The Hayekian agent still forms a core part of a specific wide memory system, one in which we serve as *a locus of control* (Hayek, 1952/1976, 5.9, 5.3). Hayek does not see any profit in expunging all vestige of Cartesian internalism: mind and social aggregates are, for Hayek, on an ontological par (Hayek, 1952/1976, 5.3, 5.22, 1979, p. 156). So here's the rub: Hayek the externalist challenges the view of Hayek the paradigmatic individualist[17] (and a raft of often contradictory assignations such as liberal, *laissez-faire* ideologue, and conservative), interpretations that I contend are skewed – even if one doesn't factor in *The Sensory Order*.

One way of sharpening up Hayek's individualist/holist compatibilism is to draw upon the work of Robert Wilson (2004), one of the leading DEEDS

theorists. Wilson formulates what he terms as the "social manifestation thesis." Wilson seeks, as does Hayek, to mediate radical Cartesian individualism and an implausible Hegelian hypostasized supra-individual social consciousness. For Wilson, much of the group-mind hypothesis can be expressed within an externalist theory of mind: "group consciousness talk" can for the most part be recast as "an aspect of the consciousness of individuals" (Wilson, 2004, p. 290). Wilson's social manifestation thesis allows that individuals have a disposition to reflect *some psychological states only when they form part of a social group* (Wilson, 2004, p. 299). If for Wilson "The minds that individuals have are already the minds of individuals in groups" (Wilson, 2004, pp. 142, 265, 307), then I can't see this as being incompatible with the methodological individualist arguing that to ascribe judgments, intentions, and the like to social groups is just a shorthand ascription to the individuals that comprise the relevant groups. The social manifestation thesis views psychological states as "taxonomically and locationally embedded in broader social systems" without having to posit some supra-group consciousness (Wilson, 2004, p. 301; Tuomela, 2007, p. 145). Although individualists and externalists agree that mental states are "in the head" and that they are causally determined, in part, by what lies beyond the head – they disagree about how mental states should be individuated or taxonomized. Hayek, the individualist, through his "soft" Kantianism, posits an intrinsic determination that avoids the notion that two individuals identical in their intrinsic properties, must have the same psychological states (Hayek, 1952/1976, 5.27–28).

An Extended Cognitive System – A Stigmergic Approach

McQuade and Butos' suggestive emphasis on *adaptive* classifying systems offers grist to the externalist mill. The "coordination paradox" was most famously articulated in Adam Smith's "invisible hand" metaphor – is essentially *a theory of collaboration* via *self-interest* – and was endorsed by Hayek (1973, p. 56; Nozick, 1974, pp. 18–22). The star example of an extended cognitive system (or a complex adaptive system) is a "market" since it displays *the* defining feature – emergent behavior.[18] For Hayek, *free* (or open and competitive) markets (Hayek, 1948, pp. 92–106)are in effect "communications systems" (Hayek, 1978, p. 34, 1979, p. 68, 1988, p. 84; Boettke, 1990; McQuade, 2007) that display the following virtues:

(1) It's a mechanism for the cooperation among strangers with *differing wants and preferences* in a given environment (Hayek, 1976, pp. 109–111),

(2) enables activity that has consequences for all its agents, despite the fact that few transactions ever directly take place *in*-person to *in*-person (Hayek, 1988, p. 14),
(3) it does not rest upon "rational" behavior (Hayek, 1944, p. 64, 1988, pp. 53–54),
(4) it breeds a certain cast of mind – the entrepreneur (Hayek, 1979, pp. 75–76), and
(5) it has epistemic (and computational) efficiencies in that knowledge is distributed and dynamic.

Now this is all pedestrian stuff. What I want to introduce here is another way of getting conceptual traction on the coordination problem in a way that emphasizes the "active" externalism of Hayek's work.[19] The significance of the concept I'm about to expound upon has been made apparent to artificial intelligence (AI)/computational intelligence researchers over the last decade. AU :15

Pierre-Paul Grassé, a zoologist, discovered in the coordination and regulation of termite colonies, the *phenomenon of indirect communication mediated by modifications of the environment* – which Grassé termed "stigmergy" (Grassé, 1959). Grassé observed that the coordination and regulation of building activities did not depend on the individual "agents" themselves, but is subject to a cybernetic feedback loop through pheromone traces and environmental modifications made by others (Hayek, 1952/1976, 2.28, 1952, ♯42; McQuade, 2007, pp. 57, 77; Marsh & Onof, 2008; Marsh, forthcoming d). In other words, *the environment acts a kind of distributed memory system*. Though the concept of stigmergy has been associated with ant- or swarm-like "agents" with minimal cognitive ability, stigmergy offers a powerful metaphor to be deployed in the human domain. And with his characteristic prescience, Hayek was onto the explanatory possibilities (Hayek, 1967, pp. 69–71; see also Hayek, 1952, ♯41–43, 51, 1978, p. 53, 1967, p. 73; McQuade, 2007, p. 77). For Clark, "[M]uch of what goes on in the complex world of humans, may thus, somewhat surprisingly, be understood in terms of so-called stigmergic algorithms" (Clark, 1996, p. 279). Stigmergic systems are a ubiquitous feature of human sociality, that include stock markets, economies, traffic patterns, supply logistics and resource allocation, urban sprawl, and cultural memes. Consider this example by Clark. Amazon.com's "collaborative filtering" technique mimics the stigmergy of slugs and ants, illustrating "patterns of action" (Hayek, 1978, p. 41). Through their activity, humans also lay trails, albeit in this case digital trails, which can be tracked, analyzed, and agglomerated.

It is computationally efficient (and easily scalable) because much of the computation has already been done offline. An item-to-item search generates a "pheromone" trail that gives rise to novel patterns of behavior. The system is computationally efficient since it only searches segments, rather than the complete database. The Amazon system's great virtue is that suppliers can be finely attuned to consumer behavior. The downside is that there runs the risk of "a kind of dysfunctional communal narrowing of attention" that can be self-fulfilling (Clark, 2003, p. 158). Clark's point, I think, is that the specter of herd behavior has latent potential and this is somewhat echoed by McQuade (2007, p. 71).

Let us consider the typical features of a stigmergic system (or a complex adaptive system if you like):

1. A context or environment
   - comprised by an indefinite number of local environments and
   - only partially perceivable through an internal dynamics that govern its temporal evolution.
2. Agents
   - There is a multiplicity of agents populating with no one individual or clustering of individuals having global knowledge.
     - Rationality is bounded.
     - Behavior is self-organized.
       - Behavior is stochastic.
       - Behavior is adaptive/dynamical.

Novel features arise from interaction of (1) and (2), features that are neither predictable nor reducible to simpler constituents. I've desisted from using the term "emergence" since the concept is highly slippery. For present purposes, it is considered in an agnostic way that may or may not correspond to the philosopher's conception (a strong variant), typically used to reject the incompleteness of the physicalist picture; or with idea that ostensibly novel phenomena is a function of the current state of knowledge, but can be grounded in underlying simple laws (Chalmers, 2006).

Now, if Hayek was centrally concerned with "communications systems" then he was centrally concerned with the communicative aspect to knowledge. If *social* epistemology[20] has the formation, acquisition, mediation, transmission, and dissemination of (for the most part *third-party*) knowledge in complex communities of knowers as its subject matter, then to say that its concern is essentially stigmergic, verges on being tautologous (Hayek, 1944, pp. 33–56). Sociality is stigmergic on the grounds that no one mind has global knowledge – there is no rationalistic master

plan or blueprint; much of the "calculation" is done through social artifacts (the market for one); and last but by no means least, it is stigmergic on the grounds of the iterated looping of behaviors within and through the environment. A stigmergic system is coextensive with any complex adaptive system (Marsh & Onof, 2008; Marsh, forthcoming d). Take the market as an example, the market would be *stigmergically* superior to all other types of market in that it is the best communications system for all manners of social and other types of knowledge that course through its veins. Of course, for Hayek a free-market best promotes the conditions for moral and political freedoms or autonomy (Hayek, 1973, p. 55).

EPILOGUE

> Both freedom and justice are values that can prevail only among men with limited knowledge and would have no meaning in a society of omniscient men (Hayek, 1976, p. 127).[21]

This quote marks an opportune time to take stock: it reminds us of what really was Hayek's lifelong concern – *liberty*. I don't share Raz' confidence in characterizing Hayek's concern with freedom as exclusively instrumental in nature, rather than intrinsic in nature (Raz, 1988, p. 7). I venture the view that for Hayek the notion of cognitive closure entails the postulation of an open society (Hayek, 1976, p. 127). On my interpretation (or emphasis if you will), there is a somewhat deflationary relation between *cognitive closure* and epistemology: cognition and knowledge are viewed dual aspects of human sociality. This conception has resonance with Alvin Goldman's "epistemics" – a multidisciplinary understanding of epistemology that gives due emphasis to the psychological processes of the architecture of the mind–brain in belief formation *and* the fact that these beliefs are modulated by a ubiquitous sociality (Goldman, 1986). Again, Hayek's prescience is uncanny.

Hayek's notion of cognitive closure, a mark of the human condition, can be ameliorated if the social and artifactual world functions as a kind of distributed extra-neural memory store manifest as dynamic traditions, part of the resources for acting, thinking, or communicating. This cognitive ← → epistemological ← → liberty tripartite is closely related to a long-standing bone of contention in Hayek centering on the two-fold claim:

(1) epistemological immodesty is the *sine qua non* of a mixed or socialist economy, and that
(2) this *inexorably* leads us on *The Road to Serfdom* (Samuelson, 2009). AU :16

The manifold ways in which this so-called "inevitability thesis" (Hayek 1944/1976, Chap. IV) can be interpreted is discussed by Farrant and McPhail (2009). Working from the 1976 edition of *The Road to Serfdom*, Hayek gives out a mixed message. The cover trumpets the book as "A classic warning against the dangers to freedom *inherent* in social planning" (emphasis added). In the foreword, Hayek claims that he has "never accused the socialist parties of deliberately aiming at a totalitarian regime or even to show such inclinations" (Hayek 1944/1976, pp. xiv, xxi). Hayek is of the view that the source of misinterpreting the inevitability thesis is terminological – that is, socialism at the time he was writing really did mean complete and utter centralization. Thirty years on, socialism in Western Europe pretty much denoted a mixed economy. So what are we to make of Hayek on this issue? (For a fine-grained history and analysis of this issue, see Farrant, 2009.)

Hayek definitely *does* believe that a necessary condition of socialism is a *degree* of centralization, political, and economic, which seriously infringes personal freedom. This looks like a causal claim: socialism cannot operate without this degree of centralization. It's a quite different (though still causal) claim that a mixed economy either leads to socialism or, for other reasons, itself produces a degree of centralization, political, and economic, which seriously infringes personal freedom. I'd agree that the link between central planning and the kind of socialism Hayek had in mind is logical. One might even see it as definitional. One might think that the diminution of freedom is itself a logical consequence if what is centrally planned, since it is no longer a matter for personal choice. But this line of argument, whether Hayek's or not, neglects the calculus of freedom. It's logically perfectly possible for central planning to restrict some freedom, but to create or increase others. Why not? Hayek can't logically rule it out. It's a causal matter. In any event, it should be remembered that Hayek's target was a rationalist *zeitgeist* that infected "socialists of all parties": this was, after all, the polemical point of the book (note the tongue-in-cheek dedication; p. 35). AU :17

Of course it matters whether one is focusing on the Hayek of 1944 or the Hayek of 1967; it is clear that Hayek had refined his views. Consider the later essay "The Theory of Complex Phenomena" (Hayek, 1967, p. 42), where he concludes that:

> … we may well have achieved a very elaborate and quite useful theory of some kind of complex phenomena and yet have to admit that we do not know of a single law, in the ordinary sense of the word, which this kind of phenomena obeys … I rather doubt whether we know of any "laws" which social phenomena obey … in the field of complex

> phenomena the term "law" as well as the concepts of cause and effect are not applicable without such modification as to deprive them of their ordinary meaning.

Hayek rightly admits that the "inevitability" *is* a vague and imprecise expression. So far as I can see, Hayek's "infelicity" is generated by a lack of philosophical precision – but his critics fare little better on this point. A philosopher would talk about some (specified) kind of necessity. I'd guess Hayek assumes causal necessity, but the covering law(s) would have to contain *ceteris paribus* clauses – which rather undermines the dramatic claim of inevitability. And what is the covering law or set of covering laws? Hayek can, it seems to me, assume causal necessity and does so at various points in his argument. The spontaneous social order emerges causally. *Epistemologically* we can't predict its features, but it's not spontaneous in the sense of being *metaphysically* uncaused. Clearly *ceteris paribus* clauses water down a law's necessity, and in this sense make its operation contingent. And contingency means that the law has a probability of <1. This is so even if the law "works" with exceptionless regularity: that's just a contingency. But *ceteris paribus* clauses don't tell you, without extra assumptions, what the actual probability is between 0 and <1. If there's a social law with *ceteris paribus* clauses to support this probabilistic generalization, then we need to know what the clauses are and what in turn their probability is. Central planning leads to the general erosion of freedom unless:

> *x, y, z* where 'x, y, z' individually or as a disjunctive set have a probability of 0.9 (or whatever).

If, on the other hand, Hayek is offering a social law as an exceptionless generalization, then presumably his whole interlocked social theory will be needed to deliver this law. (By the way, while Marx does talk of the "iron laws of history," there are other passages where historical transitions are seen as trends of extremely high probability. Epistemologically, of course, Marx never claims chronological precision as to what will happen: he can't give even the roughest of timelines). The claim might be that there's a high probability, approaching 1, that central planning will lead to the erosion of freedoms. Not just economic freedom but any freedom that relies on the rule of law, since central planning will need to override the rule of law. What is this probability claim based on? If on enumerative induction, then Hayek cannot make good this claim because his sample base is tiny. Enough said.

It might be said that philosophical fashion has not been kind to Hayek. This is more a reflection of the philosophy of mind (and the philosophy of social science and political philosophy) as practiced under the aegis of a philosophy department than of the more ecumenical philosophy of mind as practiced

under the aegis of a cognitive science department. If as Varela et al. (1991/2000, p. 13) say, "cognitive science stands at the crossroads where the natural sciences and the human sciences meet" then Hayek would be center stage.

Revived interest in certain thinkers or aspects of their work tends to occur because they have been "rehabilitated" (a new interpretive gloss has been put on their work); or because a relatively under-exploited oeuvre provides material to feed academic industriousness. Historically, *The Sensory Order* has simply been overlooked – echoing Hume's disappointment, Hayek lamented that "it fell dead-born from the press" (Leube, 2003, p. 12). The primary reason is perhaps because disciplinary boundaries as they existed when Hayek was writing, were rigid and myopic (Hayek, 1952/1976, vii; Grenell, 1954, p. 409). This said, *The Sensory Order* did garner some early reviews that, though cursory and lukewarm, were not deeply negative (Chisholm, 1954; Grenell, 1954; Schiller, 1954; Sprott, 1954). Stylistically, *The Sensory Order* is brittle; it has a great deal of repetition and qualification, obscuring Hayek's usual mellifluous style and the Austrian knack of clarity and crispness of argument. This is partly a function of (a) Hayek trying to articulate concepts that heretofore were only faintly outlined, and (b) Hayek himself may not have been the best judge of what the overriding theme of *The Sensory Order* really was, Hayek acknowledged that even trying to conceptualize the very basics was a fraught enterprise (Hayek, 1952/1976, 1.2). That in Hayek's view, *The Sensory Order* is centrally concerned with the mind–body problem (Hayek, 1952/1976, 1.10) entails a significant quotient of murkiness (Hayek, 1982, pp. 289–290).

Perhaps the earliest substantive appreciation of *The Sensory Order* came from computer scientist, Frank Rosenblatt whose "perceptron," an early version of a feed-forward learning algorithm, was influenced by the suggestiveness of Hayek and Hebb (Rosenblatt, 1958). Edwin G. Boring, an experimental psychologist, one time president of the American Psychological Association and founder of Harvard's Department of Psychology, had some good things to say about *The Sensory Order* (cited in Kresge's introduction to Hayek 1994, p. 27). According to Hayek, "… the one man who seemed to have fully understood *The Sensory Order*" was, no less, Schrödinger (Hayek 1994, p. 139).[22] The future A.I. grandee, Marvin Minsky, certainly knew of *The Sensory Order* (Minsky, 1961). Of late, the one person who has consistently promoted Hayek's achievement has been Joaquín Fuster (1995, 1998, 2003a, 2003b, 2004, 2006a, 2006b, 2008). Fuster (2004) writes that:

> It is truly astonishing that its author, in the middle of the ignorance that existed in the first half of the XX century about the anatomical and physiological organization of the cortex, would instinctively coincide with the evidence of the second half of the century.

Hayek's reputation in cognitive neuroscience was significantly boosted by fellow Nobel laureate Gerald Edelman in his influential book of 1987, but was trumpeting Hayek's achievement 5 years earlier (Edelman, 1982). Following in Fuster and Edelman's wake, others in neuroscience are now taking notice (Başar & Karakaş, 2006, pp. 195, 198). Of the better-known philosophers of mind, John Searle, has belatedly acknowledged the value of Hayek generally (Krüger, 1999) and *The Sensory Order* (Searle, 2000).[23] Of course, one should be suspicious of the hagiographical tendencies of the many disciples who claim to be Hayekians, but with such a roster of top-draw names batting for Hayek *and* from beyond the usual constituencies, it seems blatantly disingenuous to suggest that Hayek "dabbled" (Posner, 2005, p. 155) in cognitive science. Hayek supposed dilettantism has its two-fold (and linked) roots in his (a) professional pride and (b) having wide interests. Regarding the former, consider the somewhat neurotic tone here: "After The Road to Serfdom, I felt that I had so discredited myself professionally, I didn't want to give offence again. I wanted to be accepted in the scientific community" (Hayek 1994, p. 152); Samuelson (2009, p. 3, note 2) affirms Hayek's neuroses. Regarding the latter, Steele (2008, p. 69) points out that Hayek was as close to being the complete economist as characterized by G. L. S. Shackle:

> To be a complete economist, a man need only be a mathematician, a philosopher, a psychologist, an anthropologist, a historian, a geographer, and a student of politics; a master of prose exposition; a man of the world with the experience of practical business and finance, an understanding of the problems of administration, and a good knowledge of four or five languages. All this in addition, of course, to familiarity with the economics literature itself.

Hayek himself wrote: "… exclusive concentration on a specialty has a peculiarly baneful effect: it will not merely prevent us from being attractive company or good citizens but may impair our competence in our proper field …" (Hayek, 1967, pp. 123, 127). Hayek recalled that at the University of Vienna he was nominally studying law, but was "shifting from subject to subject" (1994, pp. 3, 51). As Streit (1993, p. 256) says:

> Reconsidering Hayek's rich scientific harvest, it is probably justified to argue that he could not always penetrate in depth the many fields of research in which he scored striking and often revolutionary results. But in doing so, he opened up new avenues worth further exploration.

No longer can Hayek be dismissed as a mere historical curiosity. Hayek doesn't even warrant a mention even as a historical curiosity in *Talking Nets: An Oral History of Neural Networks* (2000) and the monumental

The MIT Encyclopedia of the Cognitive Sciences (1999). This lacuna has fortunately been redressed by Fuster (2003a). Some Hayekians feel the assignation of Hayek as historical curiosity is perfectly legitimate (Feser, 2006, p. 297); this despite Feser saying earlier (Feser, 2006, p. 288) that "a case could even be made for it [*The Sensory Order*] as the most comprehensive and plausible attempt yet made to carry out the project of 'naturalizing' the mind." Hayek, the cognitive scientist is *the* preeminent theorist of sociocognition. German Chancellor Helmut Schmidt, on the occasion of Hayek's 80th birthday (1979), sent him a congratulatory telegram (perhaps prematurely) saying: "we are all Hayekians now" (Hoppe, 2004). With the rise of the prevailing technocultural form known as the World Wide Web and its essentially distributed and stigmergic nature[24], perhaps only *now* can it truly be said that "we are all Hayekians."

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Bartholo, Cosenza, Doria, and de Lessa (2009); Byrne (2009); Byrne and Hilbert (2008); Dempsey (1996); Marsh (forthcoming c); Papaioannou (2003); Steele (2004); Thompson and Varela (2001); Weimer (1982).

NOTES

1. Variations of this occur in Hayek (1978, pp. 3–4, 20, 73, 1944/1976, p. 165, 1973, pp. 5, 17, 1952/1979, p. 156, 1988, p. 22). The suggestion "that in order to understand central aspects of cognition we look not to what's in the brain but what the brain is in" is another more recent variant (Wilson, 2004, p. 212).

2. According to the Cognitive Science Society, current cognitive science comprises artificial intelligence, linguistics, anthropology, psychology, neuroscience, philosophy, and education. These days the term "multidisciplinary" tends to be over-used, but as Rizzello and Schiller point out (Rizzello, 2004, p. 257; Schiller, 1954, p. 534), Hayek was no dilettante. As early as 1919–1920 Hayek spent some time in the Zurich laboratory of Russian-Swiss neuropathologist Constantin von Monakow (Hayek 1994, p. 64; Caldwell, 2004b, p. 136).

3. Even though Ryle (1949/1990) is taken by many to be a behaviorist of sorts (Hayek, 1952/1976, 1.79–1.88), I deal at length with the KH/KT distinction in Marsh (forthcoming b).

4. Another and perhaps more basic way to conceive of the KH/KT distinction is as nonconceptual content/conceptual content – see Bermúdez and Cahen (2008) for an overview. Other ways to make this distinction is as *offline* and *online* styles of intelligence (Wheeler, 2005) and *declarative* and *procedural* memory. A recent paper by Perraton and Tarrant (2007) is skeptical of the extensional and intensional

adequacy of KH yet overlooks a whole swath of recent literature: pro, con, and hybrid.

5. Echoed in Reisman (1997).

6. Emerson M. Pugh (1914–1981) cited by his son George Pugh (1977, p. 154).

7. Hayek might well be gratified by Mohan Matthen's (2005) recent work on the classification process of sensory perception, a treatise that bears a striking resemblance to *The Sensory Order*. Others working on the philosophy of (color) perception have referred to *The Sensory Order* (Byrne (2009); Byrne & Hilbert (2008)).

8. Thanks to Istvan Berkeley for sharing this.

9. This Gödelean claim and its bearing upon people has canonical status in Hofstadter (1979, pp. 697–698).

10. It would be impracticable to explicate the voluminous debate that has become ritualized. The progenitor of these thought experiments is Nagel (1974). Hayek would find Nagel's "what is it like to be a bat" thought experiment absurd even if he wasn't totally out of sympathy with its conclusion (Hayek, 1944/1976, p. 66, 1952/1979, p. 135).

11. Mees (1882–1960) was an Anglo-American physicist who set up Eastman Kodak's famed R&D laboratory in Rochester, NY. The quote is from Mees' *The Path of Science* (Wiley, New York). It is dated as 1947 in Hayek's footnote (p. 33) and 1946 in the *The Sensory Order* Bibliography.

12. Feser's claim is that if one maintains that the argument (A):

(A) Hayek views the mind as complex, dynamic and unpredictable.
Hayek's view of the mind is the foundation for his views on economics and politics.

is valid, then, one accepts the validity of a general argument (B) of the form:

(B) Hayek views the X as complex, dynamic and unpredictable.
Hayek's view of the X is the foundation for his views on economics and politics.

But one can substitute anything for X in (B), which would make the premise true, to obtain a true conclusion. And it is indeed plausible to claim that substituting weather for X, one obtains a true premise. This would then lead to the truth of:

Hayek's view of the weather is the foundation for his views on economics and politics.

The implied *reductio ad absurdum* argument then is that, since the latter claim is patently ridiculous, the original argument (A) is therefore not valid.

The weakness of Feser's argument is that it is not because one claims the validity of the original argument (A), that one accepts the validity of (B). That is because there are lots of hidden premises in (A) that pertain to the importance that an understanding of the mind has for economics or politics (in a general and fairly uncontroversial sense), and are not true for any X (e.g., the weather).

13. Notions of a super-brain or global brain are implied in writings of Heylighen, 2007 and others. One might, in a very suggestive way, say that in much the same way that synapses are strengthened while unused connections weaken and wither away ("neural Darwinism" – Edelman 1987), so too are the social "synapses." Google's PageRank algorithm operates like this. In a recent article, the writer has coined the term "Social Nervous System" (Ross, 2009).

14. Ned Bloch (1978) "Chinese nation" thought experiment was designed as a critique of functionalism. Imagine the population of China (currently 1.3 billion) implementing the functions of neurons in the brain. Each person is assigned some role that reproduces something in the human functional network; in total, the 1.3 billion Chinese are actually reproducing the functional states of a given person. Block's objection is that it is implausible to ascribe that whole Chinese nation should have qualitative experiences while no individual member of the population experiences any pain. The upshot for Block is that if some part of what being in a mental state corresponds to a qualitative experience, then functional states are not equivalent to mental states.

15. It should be noted that this is not a blanket admonition against social change or social amelioration (Hayek, 1978, p. 19). Posner (2007) takes the view that Hayek offers no indication as to which custom(s) should be rejected. This is precisely Hayek's point – there is no Archimedean point from which to assess the desirability of a given custom. Novelty emerges or custom is made redundant through the dynamicism of social evolution – criticism is necessarily immanent and piecemeal (Hayek, 1976, pp. 24–25, 1978, p. 53, 1967, p. 73) and new rules cannot be arbitrarily laid down (Hayek, 1978, p. 11). As Gick & Gick (2001, p. 153) say "progress and tradition are interlinked." To obey no tradition is profoundly incoherent (Hayek, 1988, p. 61). Elsewhere Posner (2005) questions how Hayek's rejection of being labeled a conservative squares with his veneration of custom. Posner, as do many, fails to appreciate the inherent fluidity of ideological interpretive categories. Hayek himself (1976, p. 151, 1979, pp. 136–137) marks this problem, at least as it exists in the US context.

16. Hayek's individualism has been subject to ongoing caricature; a typical example being Simon Blackburn's *The Oxford Dictionary of Philosophy* (cited by Steele, 2002). Hayek as "extreme atomist" can be found in Galeotti (1987).

17. Hayek is a compatabilist (Whitman, 2004; McCann, 2002; Gamble, 2006; Butos & Koppl, 2007) – the term not used here as it relates to the free will debate. Of course in social philosophy there is a tension between individualism and traditionalism – the former is corrosive of the latter. As Lewis and Chamlee-Wright (2008) point out, it's not immediately obvious that Austrian atomism is compatible with social embeddedness. But this tension is not to be found in the Hayek – contrary to what Gray (1980) and Smith (1997) claim. Hayek scholars not troubled by a compatabilist reading include McQuade (2007, pp. 67–68), Gick (unpublished b, p. 2), Nooteboom (2007) and Whitman (2004).

18. Variously termed as a spontaneous order, self-generating order, or self-organizing structures (Hayek, 1978, p. 74, 1979, p. xii). In a biological context, these notions have been collectively designated a new term: "autopoiesis" (Maturana & Varela, 1980). Some not obviously familiar with Hayek, have drawn attention to "invisible hand" explanations in social emergence and the simple firing of individual neurons that together accomplish functions unknown to individual neurons (Sun, 2006, pp. 15–16).

19. Jaegher and Ezequiel (2007) sketch out enactive account of social cognition, though for them social cognition is face-to-face encounters.

20. Aside from the occasional article in an analytically orientated epistemology journal (e.g., Sunstein, 2006a), social epistemology has yet to discover Hayek.

Elsewhere, Sunstein (2006b, 2008), again in social epistemology mode, examines the phenomenon of the blogosphere through Hayekian eyes.

21. Variations on this theme can be found in (Hayek, 1976, p. 8, 1978, pp. 71, 72, 1979, p. 130).

22. Apparently, Popper was of the view that *The Sensory Order* was, in effect, a causal theory of mind, a stance that for him was untenable (Kresge's introduction Hayek, 1994, pp. 28–29). Hayek responded by saying that he was in full accord with Popper that point-instant explanations were beyond explanation (assuming that was Popper's intention). If, however, Popper denied that the *general* principle that mental phenomena are subject to physical processes, that's where they would sharply diverge. Popper, it should be noted, went onto to defend a version of dualism whereby consciousness is an emergent property (Popper & Eccles, 1977). Recall, Hayek accepted a *practical* dualism, not a metaphysical dualism: a causal analysis is compatible with a nonmaterialist view of mind.

23. Indeed, it has been pointed out by Runde (2001, p. 20) that Searle and Hayek share a very similar theory of social ontology – see Searle (1995). Someone in mainstream philosophy, who never spoke of Hayek in hushed terms, was Nozick (1974, 1981, 1993, 1997, 2001), though I don't know if he ever read *The Sensory Order*.

24. New forms of stigmergy have been exponentially expanded through the affordances of digital technology (Marsh & Onof, 2008; Sunstein 2006b; Marsh, forthcoming d).

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