Epistemic Competence*

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Some philosophers find the suggestion of a naturalized epistemology unsettling. There are many reasons for their misgivings, not the least of which is uncertainty regarding what is being proposed. At least in the classic form advocated by Quine (1969), to naturalize epistemology is to reconstruct certain traditional epistemic concerns within the disciplinary confines of empirical psychology. But, epistemological concerns are normative; partisans, as well as critics, have wondered just how empirical psychological results are to have the appropriate normative force (Kornblith 1985, Kim 1989).[1] Proponents of naturalizing epistemology have some explaining to do regarding the relations between classic normative concerns in epistemology and results in various empirical disciplines,[2] including psychology.[3] My goal here is to advance a useful way of conceiving of the relation between empirical results and their normative epistemological employment.

Misgivings concerning the normative force of naturalized epistemology are commonly associated with an insistence on a central place for ideal models. Critics of naturalizing epistemology typically feel that the philosophical tradition has a fine stock of important normative models, and they worry that much will be lost in any naturalized approach that fails to make fairly robust connections with these traditional views. Normative epistemology, they contend, has to do with ideal models to which we can measure up, or prove lacking. They worry that naturalized epistemologists cannot even say this much. I argue here that epistemology, appropriately naturalized, can overcome these misgivings. It can have a place for ideal models with normative force. It helps to conceive of naturalized epistemology as developing theories of epistemic competence. I develop this suggestion and argue that such theories will nicely provide the desired normative ideals.

I. What is Sought in an Epistemic Theory?

1. A plea for objective justification.

Epistemology addresses various interrelated concerns. This is reflected in recent discussions of epistemic justification. With Alston (1985), philosophers began to evince greater sensitivity to differing notions of epistemic justification. Pollock (1987), for example, distinguishes subjective and objective notions of justification. The subjective notion has to do with what it is permissible for an individual agent to believe, given the agent's antecedently held beliefs and standards for reasoning. The objective notion has to do with what would be permissible for an agent to believe, were the agent apprised of all the epistemically relevant facts. Pollock insists that epistemology is centrally concerned with subjective justification. He associates subjective justification with judgments regarding when agents are blameless for believing as they do, and with the situated guidance of individual epistemic agents (who, of course, can only act on what they believe). He argues that externalist accounts of justification, which deal with the objective sense of justification, "have no bearing on" the crucial issue of when epistemic agents are blameless in their beliefs. However, while one can recognize the legitimate epistemic interest that we do have in when agents can be said to have done well, given their own beliefs and standards, and in the associated subjective justification, we should resist the suggestion that this interest has been, or should be, the central epistemic interest.[4] A little reflection reveals very deep epistemological interests in issues associated with objective senses of justification.

To appreciate these epistemic interests, it will help to express a reservation regarding Pollock's characterization of objective notions in epistemology. According to Pollock (1987, pp. 61, 76-7), justification has to do with permissibility (supposedly, one is justified in believing something only if so believing does not violate some prohibition in the relevant epistemic norms), and it is intimately related to epistemic responsibility (as one is justified in believing something "just in case" so believing does not violate one's epistemic responsibilities). Responsibility has to do with duty, or "ought." One can then think of subjective and objective notions of epistemic responsibility spawning associated notions of permissibility and justification. The subjective notions have to do with how one is required and permitted to reason, given one's beliefs and norms. But, Pollock has

surprising difficulty identifying a useful objective notion of justification. He says that "the" objective notion must have to do with "what you ought to believe were you apprised of all the relevant truths" (p. 78). As Pollock understands this objective notion of responsibility, "all the relevant truths" (and what one then ought to believe) is simply "all the truths." He concludes that the objective notion of obligation is of little epistemic worth. I agree that the notion he characterizes is worthless, but there is an obvious alternative: since we are interested in how to reason, how to add to and otherwise modify ones set of beliefs, there is the issue of how one ought to modify one set of beliefs, were one apprised of all that was relevant regarding the truth-conduciveness of various processes.[5] This is a recognizable, objective, notion of epistemic ought, and it spawns useful objective notions of responsibility and justification. Further, as a general concern, it seems familiar enough.[6]

To bring out some connections between subjective and objective notions of epistemic justification, consider a parallel context: our interests in connection with health sciences and public health. In some contexts we might wish to judge whether an individual acted responsibly, doing what was permissible, given that individual's norms and beliefs regarding risks to themselves and others. Thus, we may employ a subjective notion of justification and responsibility. However, we have an interest in objective responsibility. Indeed, in the various health-related disciplines, an objective notion of responsibility dominates. Investigators must be concerned with how agents ought to behave, given all the relevant information regarding risk factors and so forth. We want our health disciplines to provide a resource for our guidance by assembling the relevant information, so far as possible. Even though any such model will be conditioned by present beliefs, it remains a model of objective responsibility. Further, most individual's beliefs and norms are such that it is an aspect of their subjective responsibility to take certain reasonable steps to draw on the information gathered by researchers concerned with the objective sense of responsibility. Individuals are commonly subjectively irresponsible (that is, by their own lights) when they do not take even minimal steps to avail themselves of the readily available information regarding health risks (of

AIDS, for example, or heart disease, or, in an open-ended way, of whatever particularly threatening diseases are known to the health experts in their society).

In keeping with these different and interrelated concerns, we find something of a division of labor. Certain professionals are charged with investigating an objective, third-person, externalist, notion of health responsibility. Their results supposedly serve a meliorative function; that is, agents can draw on such results to inform and improve their health practices. (We might add that there are yet further health professionals whose role it is to address respects in which people's common information and norms are out of step with the emerging models of objective responsibility. These health-communicators are charged with facilitating the meliorative function of the objective models by modifying the pool of information and norms, thus modifying individual's subjective responsibility.) Thus, we have various interests in connection with health practices and health sciences, and we employ various interrelated notions of responsibility in addressing these interests. Further, it is safe to say that a notion of objective responsibility (associated with important concerns for meliorative health practices) is central in the health sciences and "has a bearing on" other notions of responsibility.

The case of epistemology is parallel. Like the health professionals who are primarily interested in an objective notion of health responsibility and justification, naturalized epistemologists can often focus on constructing models of objectively responsible cognitive processing. Of course, such models are conditioned by what we believe, as they draw on our empirical results. But, they are not models of how agents ought to form beliefs given the agent's set of beliefs and norms. They are models of objective responsibility (and by extension, of objective justification) as these models of normatively approved epistemic practice are conditioned by all the relevant facts about the (truth-linked) tendencies of human cognitive processing, so far as we know them. This provides an important basis for epistemic melioration: agents can draw on these third-person-focused, naturalized, models to make improvements in their practice.[7]

To highlight the legitimate epistemic interest in such an objective notion of justification, it is worth reflecting on the fact that typically, subjective notions of justification direct the epistemic agent to seek to become "reasonably" informed regarding what makes for objective justification. This hardly seems an incidental fact. After all, from a first-person, subjective, perspective, most people recognize that their particular views about most any subject matter can be improved in various ways. Further, they recognize that this goes for their epistemic beliefs and norms. This simple recognition itself contains the germ of both the notion of objective justification and an interest in such justification.

Suffice it to say that, just as there are multiple interrelated notions of justification, there are also multiple interrelated concerns addressed in epistemological theorizing. Still, while we should recognize these multiple concerns, it is fair to say that much epistemological work, even work focusing on varying concerns, can be usefully conceived and organized in terms of its relation to an objective, externalist, notion of justification.[8] Accordingly, I here seek to develop a notion of objective justification. Objective notions might be developed in either a naturalized or more traditional epistemology. The notion of epistemic competence that I develop here is intended to provide a perspicuous way of understanding the naturalized epistemological notion of objective justification. Indeed, the notion of competence will be shown to be grounded in the central motivations for naturalizing epistemology.

2. Why naturalize epistemology?

To set the stage, let me briefly review why we should pursue naturalized epistemology. The discussion can be organized around the simple formulation: there are important reasons to do so, and no good reasons not to do so.

To naturalize epistemology is to draw on emerging scientific results in developing our account of how we ought to reason.[9] The resulting epistemological account remains unabashedly normative. We can understand the normative force of the account in this basic manner: the account deals with how we, as a class of cognizers with certain capacities, situated in the environment in

which we find ourselves, can best pursue certain goals, including the classic epistemic goal of holding true beliefs.[10] The normative force of such an account is that of a hypothetical imperative: if one values the goals, then, ceteris paribus,[11] one ought (instrumentally) to proceed as suggested. To not act or reason as recommended is then either to not adopt the relevant values or to be a fool. If one simply does not value the classic epistemological good, epistemological claims have no force (since this force is hypothetical in nature). On the other hand, playing the epistemic fool, as a matter of failing prudently to follow one's values, is more straightforwardly problematic. The relevance of scientific results is obvious: they provide the best information we have regarding our capacities and our environment.

One initial reason for turning to psychological information in epistemology, and eventually to naturalized epistemology, was provided by responses to Gettier problems and by an associated heightened sensitivity to actual causal processes that was engendered by those problems. It turns out that knowledge, and an agent's being relevantly justified in holding a given belief, cannot be analyzed simply in terms of the agent's other held beliefs. After all, an agent can hold beliefs that constitute good evidence for a given belief, still, unless the causal processes giving rise to, or sustaining, that belief involves those evidential beliefs, and involves them "in the right way," the belief is not thereby justified. However, while epistemology thus comes to focus on generating and sustaining processes, and not just relations between the contents of belief states, this hardly forces a significant naturalizing of epistemology on us. After all, it might still seem plausible that psychological information can tell us whether particular beliefs have been brought about "in the right way," while the task of determining what "the right way" <u>is</u> remains within the province of traditional, "apsychologistic," epistemology.

The real turn to naturalized epistemology comes when we reflect on what apsychologistic analysis can do by way of prescribing a certain set of causal processes as the right ways to reason. Conceivably, such analysis might attempt to underwrite a set of standards by showing that they are "partially constitutive" of our "concept of rationality." However, such claims really do little to

explain the normative force of the standards in question. The point is clearly developed by Skyrms (1986) and nicely put by Kitcher (1992, p. 63):

> The difference in attitude emerges clearly in some twentieth-century discussions of Hume's problem of induction. Some writers have suggested that adopting the inductive practices and principles that we do is constitutive of our concept of rationality. But why should we treat our current concept of rationality as privileged? Communities with different practices and principles could mimic our reply to Hume, declaring that their inductive strategies were constitutive of their concept of rationality.

Put simply, many apsychologistic epistemologists cannot really answer the question of why we should care about those standards and concepts that they "uncover in analysis." Accordingly, they cannot really account for the normative force of their recommendations.

As Kitcher (p. 63) then puts the naturalized epistemological point, "The real issue is whether employment of our inductive practices and principles is likely to lead us in the direction of our epistemic goals (most obviously truth)." Addressing this issue, naturalized epistemologists can explain why we should care about the standards they urge on us. Thus, quite the reverse of what is typically claimed, it is naturalized epistemology that has relatively little difficulty accounting for the normative status of its results, while a prioristic epistemology that does not ultimately concern itself with something like reliability seems at a loss here.[12]

Once we understand the normative force of epistemological recommendations as revolving around reliability, and thus as a matter of promise for furthering our epistemic goals, there is little to counsel against naturalization. The central point here is Quine's (1969). Deep holistic aspects of language and theory decisively frustrate all attempts at first philosophy. There are no irrevisable foundations, empiricist or rationalist, on which to build (Quine 1953; Putnam 1975; Kitcher 1980, 1983, 1992). There is no basis prior to, independent of, more certain than, and leading to, our scientific knowledge. Now, once we abandon the quest for a first philosophy, we need no longer avoid scientific information for fear of rendering our epistemology viciously circular. There is thus

no reason not to make use of our best scientific information regarding our capacities and our environment.

Much analytic epistemology has more or less explicitly saw its project as one of "reflectively codifying" our epistemological standards, as putting epistemological norms into "reflective equilibrium." It would not be surprising if some readers feel that too little has here been made of the reflective codification of our own standards as a source of normativity. But, when we get clear regarding what is involved in "reflective codification," we will embrace normative naturalized epistemology.

Codification can seek to attain either a "wide" or a "narrow" reflective equalibrium--the difference being one of how widely we conceive of the cognitive materials to be meshed into a refined system. Now, insofar as the envisioned codification is a matter of achieving a wide reflective equilibrium, it will turn out to be a form of naturalized epistemology. For, by definition, such codification draws on the full range of information with any bearing on the standards and practices that are codified; in this case, the relevant information includes information about the kinds of creatures we are, the kinds of capacities we have and can develop, and the kind of environment in which we find ourselves. Upon wide reflection, conditioned by such matters, we may find that our present standards are not as well suited to our epistemic goals as are certain other standards we might adopt. Thus, in arriving at a wide reflective equilibrium, present epistemic practices and principles are subject to change in view of information from the sciences--we are thereby engaging in naturalized epistemology. On the other hand, in pursuing a narrow codification, we seek to fashion an elegant system out of our present norms and case judgments, without regard to how well the result fits with further beliefs that might be relevant were we pursuing wide reflective equalibrium. However, if the envisioned codification is to be a narrow explication of our present standards and concept of rationality, then the question of why we should care about those standards and that concept threatens to rob the result of normative force. However, even when we begin by solely pursuing a narrow explication of our standards, there is a twist of

special significance here: even narrow reflective codification of our standards ultimately leads us to seek a naturalized epistemology, for it reveals that one aspect of those standards is their sensitivity and responsiveness to scientific developments. Shapere (1987), for example, discusses how central epistemological features of the sciences, including understandings of scientific domains, scientific goals, standards for explanation, and central concepts such as that of "observation," all undergo change in response to work in the relevant sciences. Apparently, if one looks deeply enough at our practice in the most developed and successful of our epistemological contexts, it turns out that our standards are (in significant measure) naturalized.

Summarizing, we can say that, once we have abandoned the futile hope for a first philosophy, we find much to recommend naturalizing epistemology. Such an approach allows us to account for the normative force of our results--they are hypothetical imperatives, conditioned on the familiar epistemic value of holding true beliefs. Further, naturalization seems indicated by any attempt to put our beliefs and epistemic norms into a wide reflective equalibrium. Indeed, even an sensitive narrow codification of our epistemic norms in that most central of epistemic contexts (science) points us towards (further) naturalizing epistemology.

While all this provides compelling motivation for naturalizing epistemology, many points and issues still need to be addressed. There is one important source of resistance to naturalizing epistemology that I detect in conversations and that I want to focus on in this paper. It is not a direct objection to naturalizing epistemology, but rather an attachment to an aspect of much traditional epistemological theorizing together with the supposition that this aspect is not to be found in a naturalized epistemology. The aspect in question is commonly associated with the normative role of epistemology: epistemology sets out ideals.

To appreciate how concern for ideal models can seem to poison the case for a naturalized epistemology, consider a conversation between a rather traditional epistemologist and someone with naturalizing tendencies. Suppose that the two are discussing a traditional epistemological model, for example, a coherentist model that requires that a massive amount of argumentation be

"accessible" to the agent in sustaining a perceptual belief. The naturalist might object that the model is psychologically implausible, that it grossly distorts the processes that are employed in the context in question.[13] There is then a recognizable tendency for the traditional epistemologist to attempt to brush off the objection with the following considerations:

> Epistemology is not in the business of describing how we do, in fact, undertake certain tasks, rather, it is in the business of saying how such tasks might ideally be undertaken. This is to set out ideals that may or not be paralleled, even in part, by actual human cognition. Such ideal models result from reflection on what combinations of contentful states would provide reasons for holding another contentful state. Thus deductive logic and systems such as Carnap's account of logical probability have central place. If, for example, certain forms of holistic coherence involving a given belief would support that belief, then such coherence is to be called for generally in the model. Here we ruthlessly abstract away from all implementing systems (computing devices or particular psychological entities) and provide what in effect is an epistemology for an ideal world of interrelated propositions.

This epistemology-for-a-world-of-propositions view of ideal models has deep roots in the philosophical tradition and is bound to give some would-be friends of naturalization pause.[14]

Now, such "pure reflective" idealization surely has something to contribute to epistemology, as it can add to our understanding of how systems might manage various tasks. However, one would be rash in giving it central place. Its place in our more inclusive epistemological investigations should reflect the manner in which it can inform our pursuit of such true beliefs. That is to say, its role is ultimately that of one resource within a normative epistemology.[15] It derives whatever normative force it has from its shedding light on how systems could generate beliefs that are epistemically valuable, i.e., true and likely to lead to further generation of true beliefs.

To appreciate how such pure reflective idealization could serve in this ancillary role, we should keep in mind Goldman's distinction between belief forming processes and methods.

> 'Processes' are basic psychological processes, roughly wired in features of our native cognitive architecture. 'Methods' are learnable algorithms, heuristics, or procedures for forming beliefs, such as procedures that appeal to instrument readings, or statistical analyses. (1992a, 53)

A significant, but limited, range of the possible epistemic practices are learnable by us. If reflection on "pure ideals" is to inform our normative epistemology, it will need to be by calling our attention to practices within this set of methods. After all, since "ought implies can," pure ideals can only characterize ways of reasoning we ought to employ to the extent that these ideals characterize ways that we can employ. Further, even if "pure reflection" picks out one such method, it does not follow that that method must be adopted as our normative standard. There are yet further considerations to be factored in. Learnable methods may be more or less consistently implementable (see Cherniak [1986] on feasibility orderings), may be variously demanding in terms of our cognitive resources, and may promise small or large gains in reliability over alternative methods. These matters are sensitive to details of our cognitive architecture and our environment. Obviously, they are crucial to an informed pursuit of our epistemic goals and it would be foolish of ignore them in settling on epistemic norms. Accordingly, insofar as epistemology is concerned with the pursuit of certain goals, centering on truth of beliefs, reflection on "pure ideals" can, at most serve as significant background information on which to draw. To be normatively appropriate, a manner of proceeding will need to be learnable by us and feasibly implementable without interfering with the implementation of other processes or methods that promise (as implemented by us) greater gain in valuable beliefs. Thus, while epistemology may be concerned marginally with "pure ideals," this hardly has central place. And while it may be concerned centrally with normative ideals, ultimately these are not going to be "pure ideals."

What all this indicates is that, while epistemological standards may well best be articulated in ideal models, the nature of those models, the nature of those ideals, is easily misconceived. They are not properly "pure ideals," but must be ideals tailored to us, so as to guide us in our pursuit of

epistemic value. Once we are freed of misconception regarding the sort of ideal models we should seek, the place for ideals in epistemology is worth preserving. In the next section, I describe one sort of ideal model that I believe to be particularly useful in naturalized epistemology.

II. Theories of Epistemic Competence

1. The raw materials from which to construct a theory of competence.

In this section I describe the composition of what I call theories of epistemic competence. The basic idea is to select from those portions of descriptive theory that are particularly fitted to the central epistemic concerns emphasized above. The select portions will then be made to do double duty: serving both as a descriptive account of how we do or could manage certain tasks and as a normative model. It is important that the selection criteria be objective, so that the naturalized epistemologist can account for the normative force of the resulting theory of competence. Given what is epistemically valued, one will be able to explain why we adopt a particular model (why a particular set of standards) and not some other.

It is important to be clear at the onset regarding the sort of descriptive theorizing that provides the materials from which to select and construct our theory of competence for a set of cognitive systems, such as humans. As suggested already, we want to employ empirical accounts that fairly directly address the issue of <u>how</u> we do or can manage. Significantly, Cummins (1975, 1983) articulates a sort of theorizing and explanation addressed directly to just this sort of question. Cummins cogently argues that, in order to understand talk of functions, we need to recognize and understand a second explanatory strategy, distinct from the causal explanation of events. This second explanatory strategy allows us to understand <u>how</u> a system instantiates or has a certain property by <u>analyzing</u> either that system into interacting components, or the property into simpler properties of that system. Such explanatory analyses are widespread. Most importantly, for our concerns, they are clearly of great importance within psychology, as witnessed by Cummins (1983).

The explanatory strategies of analysis and causal explanation are addressed to different questions.[16] Causal explanations are devoted to accounting for change, "Why did the system

change from state s^1 to state s^2?" When change is understood broadly, as is standard, we have causal explanations of events generally, "Why did such-and-such an event occur?"[17] On the other hand, analysis is devoted to explaining how a property is realized or instantiated in a certain system or class of systems. For example, the kinetic theory of heat allows us to address the question of how temperature is instantiated in a gas, and abstract computational theory allows us to account for how any of a range of physical systems can realize the property of being able to do multiplication.

Explanatory analysis can be pursued in several distinct ways. One prominent analytical approach is to analyze the system itself into its components. A successful analytical explanation would then show how, given the properties of these components and their mode of interaction, the system has the property of interest. Cummins calls such analyses, compositional explanations. Molecular biology is replete with examples in which the (typically dispositional) properties of certain systems are accounted for by compositional analysis. Obviously, chemistry since Dalton's atomism has produced many componential analyses. A little reflection will reveal that compositional analysis is widespread.

The second analytical approach is to analyze the property, as instantiated in certain systems. Cummins calls applications of this approach functional explanations when the property analyzed is dispositional. The analysis of dispositions may be pursued in conjunction with a componential analysis of the relevant systems. Physiological analysis in biology often involves both a functional analysis of a disposition or capacity of the system into a set of more modest capacities and a componential analysis of the system into distinct subsystems possessing the simpler capacities. But, in other contexts, functional analysis is pursued without isolating components of the system. Much recent psychological work seems to employ such non-componential analysis, as psychologists attempt to discover and analyze human cognitive capacities or dispositions in terms of simpler dispositions, and often attempt to do this without pinning down the neurophysical mechanisms underlying the relevant processes, and without worrying over whether such mechanisms are

themselves analyzable into components mirroring the capacities mentioned in the psychological analysis.[18]

Much work in psychology is directed to providing functional explanations for psychological dispositions. This is certainly true of much of cognitive psychology where investigators begin with a concern to understand how human beings solve, or at least deal with, certain classes of problems. By analysis, they seek to specify the relevant disposition (or capacity) more clearly, and to understand how it is realized by the implementation of simpler dispositions (or capacities). For example, a central theme in Nisbett and Ross (1980) is that a significant range of human inferential practices and dispositions can be understood in terms of a set of relatively simple inferential strategies, judgmental heuristics, which, while far from foolproof, are at least effective in making many cases tractable. By appreciating how these simpler strategies are applied in context, one understands how human beings "manage" when confronted with prediction problems, for example, or how they arrive at causal claims.

A virtue of the analytical approach is that it allows us to explain both successful and unsuccessful "problem solving." A disposition as analyzed in functional analysis may be generally beneficial for the possessing system, and thus a "capacity," but it can also be a general liability, or a mixed blessing. For example, the human capacity to construct, apply, modify, and reapply mental models may prove an analyzable capacity with significant utility for theory development (Nersessian 1992). Similarly, strategies by which to localize and then resolve anomalies confronting scientific theories may prove to be analyzable capacities with notable epistemic benefit (Glymour 1980, Darden 1992). In contrast, human beings seem disposed to committing the gambler's fallacy, which is clearly a liability. However, the disposition to the gambler's fallacy is probably best understood in terms of the human tendency to employ a broad heuristic: the representativeness heuristic (Kahneman and Tversky 1972; Nisbett and Ross 1980). (In the representativeness heuristic, relatively simple judgments regarding representativeness or "goodness of fit" are use as a basis for judging the probability of events or states of affairs.) Some reliance on

such heuristics is unavoidable for limited creatures such as ourselves, who need tractible ways of dealing with a flood of cognitive tasks; thus the limited reliance on such heuristics can be epistemically beneficial (Cherniak 1986). Still, our noncircumspect use of them, our overreliance, leads to systematic errors, as in the case of the gambler's fallacy. Accordingly, the representative heuristic is generally something of a mixed blessing. It becomes a more uniformly beneficial capacity as we are trained to employ it with more than common care.

Now, several of the sophisticated input-output dispositions analyzed in psychology are naturally enough associated with cognitive tasks. Explaining how such a dispositional property is realized is then to explain how the system manages the cognitive task in question. This last formulation, which echoes the Quinean fountainhead of naturalized epistemology, indicates that the theorizing connected with functional analysis is of a sort particularly well suited to serve as a basis for the construction of a theory of epistemic competence. Of course, care and selection are needed, as not all "tasks," or transformations, performed are desirable from the point of view of our pursuit of epistemic value.

A related form of theorizing is found in connectionist cognitive science. In this work, account is again given for how a system manages some task (recognizing a certain class of physical objects, for example). This is to account for the realization of a dispositional property of the connectionist system. In this respect, a connectionist account answers the sort of question addressed in functional analyses. Further, connectionist models account for a given capacity by describing the components of the realizing system--the nodes in the network and the connections between them--and their capacities. The important capacity of a node is its tendency to take on certain activation levels, given certain levels of input coming through the connections it has with earlier nodes in the network. The central capacity of an individual connection is termed its "weight"; this is its disposition to pass along a more or less diminished signal from the earlier node to the later node that it connects. Activation of various nodes in the input layer of a network will then spread through the net, as the activation of any individual node in the interior of the net results from (a) the sum of

excitatory and inhibitory signals passed to it through connections and (b) its tendency to become activated given certain levels of incoming summed signals. Ultimately, and quickly, the result will be a pattern of activation in an output layer of the network. Here the input-output disposition of the full system is accounted for in terms of a relatively narrow range of dispositional features of components. This suggests that connectionist models are themselves rather like componential analyses of a system's capacity. Perhaps they should be understood as one special sort of componential analysis. In any case, they, like many componential analyses, allow us to understand how a system realizes a particular dispositional property.

While individual connectionist models of particular networks can be understood as a rather special class of componential analyses, typical connectionist theorizing about the ability of models to performs classes of tasks is a different matter and proceeds at a different level. In connectionist theorizing there is typically little attention to details regarding particular weights of particular connections. (These do get specified in a given up-and-running connectionist model.) Connectionist theory anticipates robust multiple realizability of system-level tendencies; with each model serving as, in effect, a componential analysis of a given system and capacity, the theorizing anticipating these various models is clearly more abstract than common componential analyses.

There is a contrast to be drawn between many capacities best dealt with using connectionist theory and the capacities typically described in functional analyses. Functional analyses allow us to understand a capacity by decomposing the task performed into a set of simpler steps. On the other hand, connectionist networks often seem to realize their capacity in a single step, as the network simply settles into a pattern of activation in reaction to prompting input. It seems likely that one approach may be particularly useful in accounting for certain capacities (which are realized in a stepwise manner), while the other shines in accounting for different capacities (which are realized more immediately). Indeed, connectionism has become a focus of intensive work in large part due to the recalcitrant difficulties that analytical, program-writing, cognitive science has experienced in accounting for certain capacities associated with human memory, relevance recognition, and

perceptual recognition, for example.[19] Notably, these capacities have an "almost immediate" phenomenological quality to them.

However, such contrasts should not overshadow the fact that both these analyses allow us to understand how systems manage certain tasks. Accordingly, they both provide particularly apt bases from which to draw in constructing a theory of epistemic competence that will allow us to describe how we do, and prescribe how we could, manage cognitive tasks.[20]

2. Constructing a theory of competence from the raw materials.

So, connectionist analyses, along with functional analyses provided by cognitive psychology, provide a prominant basis on which to draw in constructing a normative theory of epistemic competence.[21] Because the processing recounted in such descriptive models need not be desirable from an epistemic point of view, only a proper subset of the full set of models characterizing human cognitive dispositions should be selected for inclusion in our theory of human epistemic competence. The principle of selection may be conceived straightforwardly in this first pass account of such theorizing: we should select those models that explain how we perform tasks that are desirable in that they are effective in bringing about what is epistemically valuable: true beliefs. Then, given this central epistemic value, we can understand why the resulting theory of competence can serve as a normative model for us.

We can illustrate the application of this selection principle by reflecting on the human cognitive dispositions mentioned earlier. Analyses of those sophisticated capacities for the development, application, and refinement of mental models seem promising candidates for inclusion in our theory of competence. Analyses of capacities for resolving anomalies would also warrant selection. Connectionist treatments of our perceptual capacities describe extremely beneficial dispositions. Our capacities for recognizing relevance relations between disparate bits of information are crucial to our epistemic success; an account of that capacity would clearly qualify for inclusion in our theory of competence. On the other hand, our tendency to commit the gambler's fallacy will be passed over as deleterious and not a part of our competence. Also to be excluded are

other sorts of overreliance on heuristics, where over-application systematically produces erroneous results. The general heuristics themselves are interesting intermediate cases. In certain respects, they seem crucial to rendering certain cognitive chores tractible, and thus must be included in our account of epistemic competence. On the other hand, they can only be included insofar as they are combined with capacities for limiting their use, so as to avoid the fallacies with which they are associated.

The above simple selection principle supposes without qualification that the accounts from which we should select in assembling our theory of competence are models of our actual dispositions. This supposition needs to be revised, for it ultimately conflicts with the meliorative dimension of naturalized epistemology. Functional and connectionist analyses will retain their role as empirical bases of a theory of competence, but we will not want to draw on them as directly as the initial discussion has suggested. Were the methods and processes we do employ relatively effective in comparison with other methods and processes that we could employ, then, in constructing a theory of competence, we could simply select in the fashion outlined above from models of our actual cognitive dispositions. For, then, the theory of competence constructed from analyses of actual dispositions would account for how we both do, and can best, proceed. However, surely we could stand for improvements in our cognitive dispositions, including those dispositions that meet some minimal standard of truth-conduciveness in handling the associated cognitive tasks. If our theory of competence is to serve the naturalized epistemological interest in melioration, by informing improvements in our dispositions (and practices), by showing us how we might better manage certain tasks, then it must describe dispositions that we do not have, but which we could acquire.

What we need is an account of a system that we might each become. The sorts of theory I have focused on to this point are relevant to such an account in at least two ways. First, the meliorative theory of competence would still take the form of a selection from functional and connectionist analyses of a human being. However, now the human being in question is a

theoretical reconstruction: a possible human being who has acquired those humanly learnable dispositions that, in combination, make it as effective in pursuing epistemic goals as is humanly feasible. Even so, the meliorative theory of competence is not the full set of analyses of such a human being, but a selection from that set. For, even the most epistemically effective human agent surely would have dispositions that do not contribute to the effectiveness of the agent's pursuit of epistemic goals, and surely would have dispositions that are detrimental to that pursuit. For example, even the optimal human epistemic agent would be subject to sorts of cognitive fatigue, some distraction, and some self-entertaining fantasy that detracts from the performance of one's epistemic chores. Further, there may be limited tendencies to fallacies that cannot be wholly guarded against. For example, trained sophisticates in statistical reasoning seem ready to rely inappropriately on heuristics when not put on their guard by professional contexts (Tversky and Kahneman 1971). Analyses of these epistemically counterproductive dispositions have no place in the theory of epistemic competence.[22] The resulting meliorative theory of competence would not tell us how we do manage, but rather, how we can best manage. It consists of analyses, not of a complete human being, actual or possible, but of those epistemically productive dispositions that, in combination, would make for the most epistemically effective agent humanly possible.

This meliorative theory of competence draws on functional and connectionist models in a second way: analyses of actual dispositions carry important information regarding how we might reason. For the dispositions that we can acquire are, in part, determined by the more basic dispositions we possess, and these are described in analyses of actual systems.

Once we have seen how to accommodate the meliorative dimension of naturalized epistemology within a theory of competence, we can go on to recognize two notions of competence, one of which downplays the meliorative concerns while the other focuses on them. Bifurcating the notion of competence is suggested by two classic formulations of naturalized epistemological concern. On the one hand, we may seek to understand (and codify what is passably effective in) how we manage to do what we do. This formulation harkens to Quine (1969). Here we have a

notion of our actual epistemic competence. Describing such competence involves analyzing our dispositions insofar as they contribute to the pursuit of epistemic goals. A theory of actual epistemic competence would be assembled from select portions of analyses of our actual dispositions. It has, at most, a weak meliorative component, as it simply recommends the more epistemically desirable of our actual dispositions. This reinforces somewhat those epistemically productive processes.

On the other hand, one can envision a family of competence theories focused on meliorative concerns. The simplest and most straightforward notion of meliorative epistemic competence has to do with how we might best, or most effectively, proceed. The corresponding theory would serve to characterize the most ambitious model that we might seek to implement; it might be called a theory of optimum meliorative competence. Of course, less ambitious notions of meliorative competence are easily recognized; we might construct models of meliorative competence that vary in the demands they place on us in proportion to our ambitions for epistemic improvement. Such models are naturally viewed as satisficing rather than optimizing with regard to our pursuit of epistemic goals. These less ambitious models of meliorative competence might be conditioned by the pace or amount of change in our present actual competence that we find bearable, all things considered.

Both theories of actual epistemic competence and theories of meliorative epistemic competence (of the various stripes just mentioned) may be thought of as being tailored to various classes of systems: to particular individuals, particular communities, or to human beings generally. As a result, theories of competence can be nuanced tools that can be made to address a significant range of epistemological concerns. This is important, for many common misgivings regarding naturalized epistemology seem to have to do with whether it can adequately accommodate epistemic concerns that emerge when we reflect on variously situated agents.[23]

III. Competence and Idealization

We now need to get clear on the respect in which a theory of epistemic competence is an idealizing theory, and on the respects in which it is not idealizing.

It is common to think of idealization as a matter of freedom from the constraints of descriptive fidelity. This is the respect in which traditional, apsychologistic, epistemologists have thought to look for ideal theory. Indeed, they have commonly ignored the limitations of all real (perhaps even realizable) physical systems (Cherniak 1986). They have then recommended a set of transitions between contentful states, a sort of processing, while being indifferent to whether or not it is, or even could be, instantiated in humans.[24] As characterized earlier, this is to seek an ideal epistemology for a world of propositions.

I have already argued in the preceding section that this sort of "pure reflective" idealizing model, this sort of "disembodied epistemology," is not really what we want in epistemology. (At least it is not our central concern, although it might serve as an ancillary project.) Obviously, theories of competence involve a very different sort of idealization. Theories of competence are atuned to the actuality and possibility of various cognitive dispositions. They are produced by judicious selection from analyses of just such matters.

Let us now distinguish two sorts of idealizing theory (or generalization) that abstract less from real systems than do the sort of radical idealization just repudiated. Both sorts formulate approximate regularities within a class of actual systems. The first sort can be termed general approximating idealization. Such generalizations provide an approximate characterization of the gross, or system-level, behavior of certain systems. As an example, consider the ideal gas law (for a sample of gas, the product of its pressure and volume is porportional to its temperature). Note that the properties related here are all properties of the general system whose behavior is characterized--they are all properties of the sample of gas. The relation asserted here is only approximately realized: the law characterizes the behavior that would be evinced by a sample of gas in certain "ideal conditions"--behavior that is approximated more or less closely depending on how closely the ideal conditions are approximated. (These conditions themselves typically are not formulated in statements of the law.) Accordingly, approximating idealizations ignore systematic deviations associated with special sorts of cases. What is most characteristic of such generalizations is that

they ignore the underlying details, the "mechanisms," that would account for the realization of the phenomenon characterized. Such details typically would account for both the respects in which the phenomenon adheres closely to the approximating characterization and the respects in which it deviates. In contrast to the ideal gas law, the kinetic theory of heat in gases is not fundamentally a general approximating idealization; it treats of the underlying mechanisms accounting for rough realizations of the ideal gas law, and for deviations in cases of high pressures, for example. Notice that this manner of characterizing general approximating idealization makes being such an idealization a matter of whether or not some underlying levels, realizing the gross regularity, are themselves characterized. It is a matter of characterizing the system or phenomena at a single level of analysis.

One caution to guard against misunderstanding: when I speak of "underlying details," and of "the mechanisms accounting for the realization of a phenomenon under study," the relevant "mechanisms" need not be the rudimentary physical realizations. Rather, I simply have in mind lower-level features and dispositions of the system that account for the realization of the higher-level features of the system analyzed. Such features might be basic physical properties of components and their organization, but they need not be. The mechanisms for the realization of a sophisticated cognitive disposition may be just somewhat lower-level cognitive states and the relevant transition dispositions, or they might be abstract states of the realizing dynamical system. Functional and connectionist analyses can turn up such lower level mechanisms without specifying how they themselves are ultimately realized in basic physical properties and organization.

We should distinguish general approximating idealization from what I will call analytical idealization. In analytical idealization we analyze a system in terms of a set of interrelated dispositions at several levels. (Again, this need not involve characterizing the system in terms of its basic physical or even biological mechanisms.) The kinetic theory of heat in gases, as discussed above, is a case of analytical idealization, as are functional and componential analyses generally. In giving such an account, realizing processes, mechanisms, within the system are characterized. In

such analyses, we are typically appealing to only a select set of any actual system's dispositional features.

While such analytical-idealizing analyses do go into details, in a way not paralleled by general approximating idealizations, the characterization of a select set of dispositions makes such accounts approximating. It does so because, by being so selective, one is necessarily characterizing an open system, a system that is subject to influences that go unmentioned in the analysis of the system.[25] Accordingly, the generalizations of a system idealization are invariably ceteris paribus generalizations, characterizing likely developments in the processes of an open system. The dispositions of such systems and subsystems are then characterized as operating in normal conditions, which is to say, as operating with "no defeaters" (Henderson 1993, chpt. 8.).

General approximating idealization is not the most serviceable basis for naturalizing epistemology, for (taken alone)[26] it systematically evades certain central concerns. The problems are not so much with approximation (which is to some extent characteristic of analytical idealizations as well as general approximating generalization), but with the lack of attention to how the system manages. This matter is central to the interests that lead us to draw on empirical theory in the first place. This spawns at least two serious misgivings regarding the epistemic utility of such idealization.

First, as a helpful model that could inform practice, a theory of epistemic competence often needs to do more than simply recommend a rough output for a set of inputs. It should inform us of the processing by which we can manage such general dispositions. In other words, it must give us enough details to enable us to get where we are recommended to go.[27] The concern for how a task is to be managed is (or can be) important, and this aspect of competence theories is contrary to the thrust of general approximating idealization.

The second reason for not constructing competence theories that are general approximating idealizations, has to do with the demands on constructing a meliorating theory of competence. If we wish to understand not just how we do manage certain tasks, but also how we could manage those

tasks, then we must be able to determine what sorts of processing are feasible for us humans before we can select the most effective of these ways. But, as we have already seen, determining what dispositions we can acquire requires information about what dispositions we have to begin with. Thus, a proper theory of competence must be grounded in information regarding such details, for only then can we appreciate really how it is that we might proceed.

In theories of competence, then, we should attend to real processing tendencies (or feasible tendencies) that account for how a system manages (or could manage). Thus, we should employ analytical idealizations detailing epistemically desirable subsystems of our general psychological system. Now, in keeping with my earlier general remarks, such analytical idealizations will be approximations, for, notoriously, psychological systems and subsystems are open systems. So, theories of epistemic competence are analytical idealizations characterizing, ceteris paribus, the tendencies of systems that are subject to interruptions. The psychological processes analyzed there can be blocked by other processes of a yet wider psychological and physiological system (as when anxiety, hunger, or drowsiness preempts my characteristic insightful processing) or by processes impinging from without the wider system (as when I am trampled by a rhino, or distracted by loud music).

Thus, in constructing a theory of competence, we begin with a non-distorting descriptive idealization dealing with how we, as psychological systems, manage certain tasks. From this we select those analyses that detail epistemically desirable ways of managing. Further, we use the descriptive analyses to envision feasible or tractable ways we might manage certain tasks, where those ways are superior to those we presently employ. The overall result is a descriptively constrained form of idealization that addresses the normative concerns characteristic of naturalized epistemology.

It is useful to compare the envisioned theory of epistemic competence with the theory of linguistic competence found in theoretical linguistics. To begin with, both have a descriptive component. Further, while the descriptive component sought in both cases may have an idealizing

and approximating character, in neither case should the idealization be fundamentally a matter of approximating idealization. The point is reflected in Tienson's (1990) discussion of the sort of idealization needed for theories of competence in linguistics:

> But the analogy with ideal physical theories does not really fit Chomsky's intentions, and it isn't the right way to be a realist about theories of competence. Ideal gas laws do not aim at describing anything that exists in particular volumes of gas. But it is clear that Chomsky intends a theory of competence to aim at describing something that exists in each speaker. There is some mechanism in you that generates actual linguistic knowledge--when the rest of the system cooperates. The theory of competence aims at characterizing that very mechanism, not some ideal to which it approximates (p. 30, emphasis in the original).

What is "in you," it seems, is a select set of dispositions that together constitute a subsystem of the wider psychological system. These are described in a analytical-idealizing analysis.

Indeed, the concern for mechanisms describable by analytical idealization seems to be the central parallel between the linguistic and epistemic theorizing about competence. The practical and meliorative normative concerns of naturalized epistemology seem quite different from the normative force of theories of linguistic competence. One important difference has to do with the place for notions of success, or correctness, arising outside the theory, and constraining the theory. Success in the linguistic context centers around matters such as agreement and coordination of language speakers. In effect, the linguistic theory of competence comes to characterize what counts as successful performance here, as much as it characterizes how it is realized. On the other hand, in the context of epistemic competence, the notion of truth-conduciveness provides a more independent basis for selecting the relevant components of the theory of competence. Here the theory does not characterize what counts as epistemic success, but how we can best pursue our epistemic goals.

Finally, a clarifying qualification is in order regarding the level and amount of detail that is in order in a theory of epistemic competence. I have argued that a theory of competence "must be

grounded in information regarding details" or regarding underlying mechanisms if it is to address adequately the concerns characteristic of naturalized epistemology. In part, this is because such information is needed in getting a fair handle on what sorts of processing is feasible for us. In part, this is because sometimes the relevant processing requires stepwise implementation that attention to realization brings to light. However, particularly when we are thinking of borrowing from connectionist accounts, the level of detail regarding mechanisms that is appropriate and needful has significant limits. Certainly, competence theories need not include particular, "fleshed out" or "articulated," connectionist models for the realization of particular dispositions. Generally, it would be unhelpful to provide a model of the network in question, down to particular connections and their weights. In view of multiple realizability, such detail would be quite beside the point. Rather, what would be called for is a more theoretical connectionist account of families of dispositions and their connectionist development and realization. For example, connectionist models promise to explain important families of our perceptual capacities, as they explain how networks can be trained up to be competent perceivers. Thus, we could look for connectionist accounts of kinds of perceptual managing, a general account of the "how" of performing a set of perceptual tasks, and of the "how" of developing, or coming to have, the relevant capacities. The theory of epistemic competence would best adopt accounts at this level, recommending that we be trained up to have and employ dispositions to the sort of connectionist processing in question.

I have here advanced a model for the sort of account that I believe should feature in our naturalized epistemology: theories of epistemic competence. Competence theories provide a kind of idealized model with significant normative force. The normative force is that of a hypothetical imperative, conditioned on the pursuit of our central epistemic value: true beliefs. The selection from analytical-idealizing, empirical theory allows such models to have strong meliorative dimensions, overcoming the worrisome suggestion that naturalizing epistemology will be intrinsically limited to rubber stamping extant practices. Distinguishing between theories of actual epistemic competence and theories of meliorative epistemic competence also help us appreciate the

various normative dimensions captured in the naturalizing models envisioned here. Such models provide us with accounts of "strong" or "objective" justification. I have argued that, while the concerns we have in connection with epistemological theorizing are not all directly addressed by models of objective justification, much professional epistemology is well conceived as organized around providing such models. I have suggested how theories of epistemic competence can be variously focused to provide a nuanced set of tools in this regard.

Notes

* I wish to thank Terry Horgan, Mark Timmons, and John Tienson for helpful discussions relating to this paper. I also thank Mark Timmons and a reader for this journal for helpful remarks on an earlier draft.

1. In some measure, such concerns probably reflect an overly narrow reading of Quine's (1969) recommendation. Gibson (1988) provides a fairer reading of Quine's proposal.

2. Recent discussions by Kitcher (1992) and Goldman (1992a, 1992b) have helped clarify these issues.

3. As Shapere (1987) argues, psychology is not the only empirical science on which a naturalized epistemology needs to draw. See also Kitcher (1993). However, in this paper, I focus on a psychological element of such an account.

4. Foley (1993) provides a discussion of various notions of rationality, and various notions of epistemic rationality in particular. In several respects his discussion parallels my account of various notions of responsibility and justification. Foley find room for multiple fruitful notions ranging from egocentric rationality (roughly what I term subjective rationality) to objective rationality. Refreshingly, while he himself develops an interesting theory of egocentric rationality, he recognizes an epistemological place for more objective notions.

5. Of course, this must be understood in a way that avoids the single-case (and related) objections to reliablism, and so must be fleshed out along the lines suggested by Goldman (1986).

6. I say it is an objective notion. There are several distinguishable families of objective notions--of justification, responsibility, permissibility, and so on. Pollock mentions an objective notion of responsibility alright, but not the objective notion of responsibility, nor the most fruitful one, nor the one most closely related to what is typically featured in naturalized epistemology.

7. Kitcher's (1992) incisive general overview of naturalized epistemology emphasizes the meliorative concerns.

8. One indication of the importance of objective justification for epistemology is provided by Goldman (1992a), who compellingly argues that a notion of objective justification, which he terms "strong justification," features prominently in our thinking regarding knowledge, more prominently than weaker (subjective) notions.

9. In characterizing naturalized epistemology, it is helpful to distinguish two broad forms of philosophical naturalism (from among the variants of philosophical naturalism). On the one hand, there is what might be termed "metaphysical" or "ontological naturalism," which seeks to ground certain prima facia nonnatural features in respectable natural properties that are the topic of the natural science. Ethical naturalism is standardly a form of metaphysical naturalism. For, in the realist variants of ethical naturalism, normative properties (such as goodness or oughtness) are reduced to (or at least said to supervene on) natural properties, while in the antirealist variants, normative "properties" they are said to be fictional, and the relevant idiom is given a noncognitivist treatment. However, on the other hand, there is what might be termed "methodological naturalism" which seeks to employ and accommodate results in the sciences, but which may employ unanalyzed values and presuppositions. For example, engineering is typically such a methodological naturalist endeavor. Indeed, engineering disciplines are commonly taken to be applied branches of the relevant sciences in which values (such as minimizing the risks to human life, conservation of energy costs, and so forth) are presupposed. Naturalized epistemology, as proposed by Quine (1969, 1986), and as pursued here, is a form of methodological naturalism (see also Gibson 1988). While the discussion may have implications for metaphysical naturalism, these are not taken up here.

10. Several philosophers, including Goodman (1978) and Stich (1990), have wondered whether we really do, or should, value true beliefs. As Goodman points out with characteristic panache, we seem not to value just any true belief, as we shun "trivial truths," and he concludes that, ""The truth, the whole truth, and nothing but the truth" would thus be a perverse and paralyzing policy for any world-maker" (p. 19). But, such reservations can themselves be accommodated within the context of an epistemology that sees truth as the preeminent epistemic value. After all, not all beliefs, or even all true beliefs are equally conducive, in context, to the production of further true beliefs. What we seek are beliefs, preferably true beliefs, that are likely to lead to yet further true beliefs.

11. The ceteris paribus clause here reflects the fact that instrumental rationality ultimately must take account of multiple competing ends.

12. More traditional epistemology may mimic naturalized epistemologists here. For example, Bonjour, who seems not to be engaged in naturalized epistemology, can allow for considerations of reliability to enter into the arguments supporting a given belief and its generating processes. Indeed, when pursued robustly enough, such coherentist reflection would seem to lead to one variant of naturalized epistemology. A given belief turns out to be (subjectively) justified when there are accessible to the agent coherence-theoretic arguments that (on balance) indicate that its generating process is reliable. Here, we can appreciate the normative force of the situated judgments regarding acceptable processes.

13. While the case cannot be made within this paper, I do believe that a theory of competence employing emerging connectionist accounts of perception would support such a criticism of important recent coherentist accounts such as Bonjour (1985). In this manner, competence theories within naturalized epistemology can be seen as joining issue with more traditionally oriented epistemology (Henderson 1994).

14. However, it is worth noting that even the "pure ideals" commonly envisioned would not be as independent from general scientific work as the designation might suggest. The reasons are familiar from Quine (1953) Kitcher (1980, 1992).

15. One set of very general limitations on the force of such "pure ideals" can be seen as arising from the limitations, for purposes of computing the algorithms that typically comprise such ideals, of any finite system, or of any physically realizable system, or of any such system within the life of the physical universe. Cherniak (1986, chpt. 4) argues, from recent results in the field of computational complexity, that most algorithms for deductive logic are, when generally applied, intractible for such systems.

16. Cummins refers to the strategy of causal explanation as the subsumptive strategy. This reflects an allegiance to the covering-law model of explanation that I would avoid.

17. This may be too narrow a characterization, for some causal explanations may be devoted to explaining why certain interactions did not produce a certain result. Accordingly, it is perhaps best to think of causal explanation as explaining the development of a system in certain respects.

18. This is not to say that psychologists are, or should be, indifferent to whether their posited psychological capacities can be neurophysiologically realized. Far from it. Rather, the point is that, in their psychological analyses, there need be no suggestion that distinct neurophysiological components are responsible for distinct psychological dispositions, nor is there a suggestion that nondisjunctive neurophysiological components realize what is analyzed as a single psychological disposition. Neurophysiologically salient "black boxes" need not correspond to psychologically salient ones.

19. For general discussions, see Dreyfus and Dreyfus (1986), Horgan and Tienson (1991, forthcoming).

20. Some examples of how cognitive psychological analyses can inform our epistemology are provided by the papers in the parts I and II of Giere (1993). Examples of the use of connectionist resources can be found in Churchland (1989, 1992).

21. There may be other sources on which to draw. But these just discussed are a broad lot themselves and plausibly comprise the bulk of the raw materials.

22. Significantly, the theory of competence resulting from such a selection will surely provide for the achievement of cognitive feats that no possible human could achieve. After all, even the most epistemically efficacious human being would be burdened by dispositions not mentioned in such analysis--epistemically counterproductive dispositions, that would from time to time interfere with the implementation of the dispositions mention in the theory of competence. Any human would be subject to certain distractions, or to fatigue, for example. (Of course, counterproductive dispositions may be characterized in a theory of competence when an aspect of competence are dispositions to limit them.)

23. Goldman (1992b) argues that many standard "counterexamples" advanced against reliablist epistemology can be defused if we think of common, or "intuitive" judgments regarding justification in particular cases as being spawned by an inappropriately inflexible application of a folk-epistemology that is itself reliablist in character. Theories of competence seem perfectly suited to being defended in the manner Goldman suggests.

24. For example, constructivist empiricists sought to show how talk of objects could be understood as constructions out of sense-datum reports, or some other basis taken to provide an unproblematic given. Whether or not humans, or any other creature, ever engaged in the relevant constructive processes was

treated as relatively unimportant. It was thought that to show that "object-talk" is "in principle," or ideally, constructible out of the observational language would show that such talk is "epistemically innocent."

25. This is so because, being selective, one fails to mention certain dispositions of the system and its components. These may have to do with the system's tendencies to react, given certain impinging features from within the broader environment. For example, an analysis of the workings of the system maintaining blood sugar homeostasis does not mention the tendencies of that system to be interrupted by massive projectiles, or by temperature extremes, for example. On the other hand, the ignored dispositions may have to do with dispositions of components of the system in question that do not involve impingements from physically external things. For example, a thermodynamic characterization of a system might ignore the disposition of a few atoms of a mildly radioactive trace element in the system to spontaneously decay so as to release further energy into the system. When dispositions of either sort are ignored, we get an approximating characterization of likely developments in the system.

26. Of course, approximating idealization can represent a fruitful level or stage in theorizing. It may serve to roughly characterize phenomena to be given more detailed analysis, for example. It would then serve as a preliminary to the sorts of theorizing I do recommend. Also, at certain levels of detail within an analysis characterizing how a system realizes certain dispositions, we may resort to such idealization. But, by this point, we would already have a substantial characterization of mechanisms within the system in question. The point is that approximating generalization of the gross behavior of a system cannot serve as the basis from which to select and construct a theory of competence, for it lacks the resources to address certain questions associated with naturalized epistemology.

27. This is particularly important when the "how" is characterizable in terms of a stepwise procedure that we would want to follow. But it is also true when the "how" is to be understood in terms of the more immediate

sort of connectionist processing. Connectionist elements in a theory of competence allow us to understand what sorts of tasks can be best handled in these ways and how that competence might be developed. One suggestion of some connectionist reflection is that many tasks will early on be handled by stepwise processing, but may later be better handled in a less stepwise fashion characteristic of certain connectionist systems (see Dreyfus and Dreyfus 1986, 1988). Such matters could be accommodated within a theory of competence.

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