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Should we eliminate the innate? Reply to Griffiths and Machery

Muhammad Ali Khalidi

Griffiths and Machery (2008) have argued that innateness is a folk notion that obstructs inquiry and has no place in contemporary science. They support their view by criticizing the canalization account of innateness (Ariew, 1999, 2006). In response, I argue that the criticisms they raise for the canalization account can be avoided by another recent account of innateness, the triggering account, which provides an analysis of the concept as it applies to cognitive capacities (Khalidi, 2002, 2007; Stich, 1975). I also claim that they have not demonstrated that the folk notion of innateness is unsuitable for rehabilitation in a science of cognition. I conclude that they have not made the case that the notion of innateness ought to be eliminated from a scientific account of the mind.

Keywords: Cognitive Capacities; Eliminativism; Folk Psychology; Innateness

In a recent article, Paul Griffiths and Edouard Machery (henceforth G&M) argue that the concept of innateness has outlived its usefulness in scientific inquiry. It is allegedly a folk notion that has become downright misleading as we discover more about ourselves and other organisms. In their view, the concept of innateness is inextricably linked to “assumptions which persist from pre-scientific thought” and should be discarded altogether (Griffiths and Machery, 2008, p. 411). They conclude: “it is time that we freed ourselves from the idea of an innate characteristic just as we have freed ourselves from the idea that any projectile must eventually run out of force and fall to earth” (Griffiths & Machery, 2008, p. 411).

G&M’s provocative paper raises important questions as to whether the concept of innateness can be made to serve a significant purpose in science, as well as concerning

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the relationship between folk psychology and scientific discourse. When it comes to the first issue, the understanding of innateness that they are most concerned to undermine is the canalization analysis that has been articulated in most detail by Andre Ariew (see e.g., Ariew, 1999, 2006), and inspired in part by C. H. Waddington. Although they take issue with defenses of the concept of innateness proffered by both Ariew and myself, they do not directly criticize the “triggering account” of innate cognitive capacities that I have advocated in earlier work (Khalidi, 2002, 2007; see also Stich 1975). As to the second issue, G&M contend that “far from facilitating the study of psychological development the innateness concept actually obstructs it” (Griffiths & Machery, 2008, p. 402). In this paper, I intend to address both issues raised by G&M, first by showing that the specific problems they raise for the concept of innateness do not undermine the triggering model of innateness, and then by arguing that they have not demonstrated that the folk concept of innateness plays an obstructionist role in the science of cognition, and therefore that it should be eliminated at the current stage of scientific inquiry.

1. In Defense of Innateness in Cognition

In arguing against innateness, G&M have raised some serious problems that primarily afflict the canalization account of innateness (Ariew, 1999, 2006). They do not criticize other philosophical accounts of innateness, perhaps because they think that the same (or similar) problems arise for other accounts. Be that as it may, in this section, I will argue that the objections they raise for the canalization account of innateness can be avoided by another account, namely the triggering account of innateness (Stich, 1975; Khalidi, 2002, 2007).¹ Before showing how that account manages to escape their objections, I will begin by giving a brief summary of the account itself.

On the triggering account, the concept of innateness as applied to cognitive capacities can be understood in dispositional terms. An innate cognitive capacity is one that has a disposition or tendency to be triggered on the basis of an environmental input that is impoverished by comparison to the resultant cognitive capacity. For instance, a claim to the effect that birdsong is innate to a certain species of bird is tantamount to a claim that the song for that species can be acquired in the absence of exposure to that species’ song. If birds can acquire normal adult song without actual exposure to that song, then it is safe to conclude that some aspect of birdsong is innate for that particular species. It may well be that there are quite specific conditions that need to be in place for birdsong to be acquired in that species, but so long as these conditions fall short of actual exposure to adult song, then we can infer that we are dealing with some kind of innate endowment. Such specific conditions are usually regarded by investigators as “triggers,” and they are so called because they fall well short of the output. That is just what it is for something to be a trigger, rather than, say, a learning regimen. Moreover, innateness is a matter of degree, and while not exactly quantifiable, degree of innateness is roughly

proportional to the impoverishment of the trigger: the more impoverished the trigger the more substantial the innate endowment.² To sum up, a cognitive capacity is innate to the extent to which it has a disposition to be acquired on the basis of an input that falls short of the resulting competence. It is worth noting that this is not meant as a definition of the concept that would result in an unrevisable conceptual truth, since definitions are not likely to endure in an area of active empirical inquiry. It is meant, rather, as an attempt at theoretical *explication* (in Rudolf Carnap's sense) that largely accords with the way in which the concept is currently used in cognitive science.³

The triggering account might seem to agree intuitively with the canalization account, since the property of being predisposed to be triggered by an environmental stimulus appears to be closely related to the property of being stable across a range of environments. On the canalization account, a phenotypic endstate is canalized to the degree to which the development of that endstate is insensitive to a range of environmental conditions under which the endstate emerges (Ariew, 1999, p. 128; see also Ariew, 2006; Collins, 2005).⁴ Surely, it might be thought, a trait that is insensitive to a range of environmental changes is one that is liable to require minimal input from the environment, and vice versa. Intuitively, it may seem as though a canalized trait is one that is manifested in a wide range of environments and would therefore require minimal input from the environment, which is to say that it would be triggered. Conversely, a trait that merely needs to be triggered may appear to be one that would emerge across a large spectrum of environments. However, the two characterizations are conceptually distinct and importantly different in a number of ways. To see this, note that a trait may emerge in a range of environments but might require substantive input from the environment, input that occurs widely, or indeed universally, in the environments that the organism encounters. Conversely, a trait might be minimally triggered by certain environmental cues, but those cues may only occur in a narrow range of environments and the trait may therefore not be buffered against a range of environmental conditions but rather require very specific circumstances to become manifest. Thus, invariance is neither sufficient nor necessary for triggering.⁵

The difference between the triggering account and the canalization account can be elaborated further by considering one of the principal criticisms that G&M offer of the latter. To counter the notion that the innateness of some trait can be understood in terms of relative independence from a range of environments, they say that "it is important to keep in mind that poverty of the stimulus arguments [which are the paradigmatic arguments for innateness] do not show that the development of a trait is independent from the environment. Rather, if successful, they show that it is independent from a *specific* [italics added] environmental condition" (Griffiths & Machery, 2008, p. 407). This observation serves to underscore one of the most significant differences between the canalization account and the triggering account: the latter does not say that an innate trait will develop come what may, nor even that it is heavily buffered against environmental variation. Instead, it says that when it comes to innate cognitive capacities, the environmental input

falls well short of the output. The close connection between the triggering account and poverty of the stimulus arguments constitutes one of the advantages of the triggering model over the canalization model. We identify some specific environmental stimulus that would be necessary to acquisition by learning. If that stimulus is absent or impoverished in some way, we conclude that the trait is (relatively) innate. This also explains why poverty of the stimulus arguments are the paradigmatic arguments for innateness: these arguments identify the relevant input, point to its impoverishment relative to the output, and conclude on that basis that an innate endowment is involved.⁶

Here, it is necessary to address a worry that might arise concerning the triggering account. It may be thought that there are cases in which the input does not fall short of the output, yet the emerging trait would rightly be considered to be innate. Consider the case of human children learning language. The input for human infants is generally full-blown exposure to their native tongue, yet natural language or a capacity for acquiring language, is widely held to be innate to the species to a significant extent.⁷ Whether or not linguistic nativists are right to think that we have an innate endowment for language-learning, their basis for thinking so is surely *not* that human infants do not enjoy full-blown exposure to language. That they do have such exposure is a fact widely acknowledged by nativists, but it is not thought to undermine their position. Hence, it cannot be that their reason for thinking that language is innate is that the input falls well short of the output. There are two points that need to be made in response to this worry. The first is that while nativists about language recognize that human infants are awash in a sea of language, their claim is that the duration of this immersion and the type of input that they encounter while acquiring their native tongue are such as to underdetermine the resultant competence. Typically, nativists argue that certain linguistic constructions are either absent or very rare in the linguistic corpus that children are exposed to, and that the evidence is insufficient to enable them to generalize to the syntactical rules underlying such constructions. Thus, the nativist claim is made precisely on the grounds that the input regarding those aspects of language underdetermines the output. This makes it clear that the input needs to be characterized quite precisely in order to determine whether and in what ways it is impoverished, if indeed it is. What may seem like an abundant input may not really be so on closer inspection. The second point to emphasize is that there will no doubt be cases in which the input is minimal, yet the organism might not acquire the cognitive capacity in question, even though that capacity is innate to some degree. Suppose that the organism did not succeed in achieving competence, not because there was not enough informational input, but because that input was not processed by the organism (due perhaps to an attention deficit or some other obstacle). In such cases, we would be wrong to conclude directly that the cognitive capacity in question is not innate. On the triggering account, a capacity is considered innate if it manifests itself in impoverished circumstances, but that is not to say that it should generally be considered non-innate if it does *not* manifest itself in such circumstances. That is the nature of a dispositional account. (Compare: if a glass does not break when dropped

because it is covered with bubble-wrap, we would be wrong to conclude that it is not fragile. However, if it does break when dropped, then it is right to conclude that it is fragile.) This is another respect in which the triggering account does not provide a definition of innateness, since it supplies a necessary but not a sufficient condition.

G&M argue, rightly in my opinion, that what has been shown by nativists when it comes to the acquisition of some cognitive capacities is that “some prominent environmental factor does not affect the development of the trait,” not that “the traits in question have some general property of insensitivity to the environment” (Griffiths & Machery, 2008, p. 404). But it is worth emphasizing, as G&M do not, that the “prominent environmental factor” is not any old aspect of the environment. For each cognitive capacity, there will be one or a small set of environmental factors that would be particularly relevant to the acquisition of that particular cognitive capacity by way of learning, and if we can establish that *that* factor is not necessary for acquisition we can conclude that the cognitive capacity in question is not wholly learned and therefore innate to some degree. The limiting case would be one in which no trigger is needed and the cognitive capacity develops in the total absence of any of the relevant environmental factors. All that may be needed is that the organism has attained the appropriate developmental phase. In these cases, we can speak of a “null trigger,” since a cognitive capacity that can appear in the absence of any relevant stimulus is paradigmatically innate. Of course, to say that none of the relevant environmental factors is necessary for its appearance is not to say that we can do without the environment altogether—that would be absurd. As G&M observe: “there is no such thing as raising an animal without an environment, only raising it without access to some specific aspect of the environment” (Griffiths & Machery, 2008, p. 404). In the null case, none of the relevant specific factors need to be in place for the cognitive capacity in question to become manifest.

It may be admitted that the dispositional account that I am defending has the resources to account for the fact that innate cognitive capacities may require very specific environmental triggers to be manifested. Indeed, that could be regarded as the driving force behind the account. But G&M raise a related issue that might be thought to cause problems for the triggering account of innateness. They point out that the stimulus required for the emergence of a particular trait may not be obvious “on *a priori* grounds” (Griffiths & Machery, 2008, p. 407). In other words, the “relevant environmental factors” mentioned in the previous paragraph may not be easily identifiable. There are a variety of cases in developmental biology in which a phenotypic trait of some kind requires a specific trigger to be manifested, where this trigger is seemingly unrelated to the resultant trait. To cite just one example, also cited by G&M, there is a preponderance of evidence to show that maternal stimulation of male rat pups is a crucial environmental factor in behavioral development, exerting a direct influence on masculine sexual development and successful reproductive activity by those pups after they reach adulthood (Moore, 1992). Who would have thought that the extent to which neonate rats are stroked by their mothers would have an effect on the way in which those rats eventually develop sexually and reproduce? The reason that such cases might be considered to pose a

problem for the triggering account of innateness is that if innate cognitive capacities are those that have a tendency to be triggered, then the existence of non-obvious environmental triggers may make it exceedingly difficult to determine which cognitive capacities are indeed triggered. G&M write: “as far as we know, evidence is lacking to assess whether the development of children’s syntactic knowledge of a given language, of their mindreading capacity, or of their moral sense depends on the presence of specific non-obvious stimuli in their environment” (2008, p. 407). The implication is that in any given case, we may find it all but impossible to rule out a range of non-obvious putative triggers, and if we are unable to do so, then we will be incapable of determining whether or not a cognitive capacity is innate.

In order to respond to this objection, we need to be clear on what is meant by a “non-obvious” trigger. Obviousness is a relative property, for what may be obvious to some inquirers may not be to others. Since G&M do not offer an explicit construal of “non-obvious” in this context, one way of making this objection more precise would be to construe the obviousness of the trigger in relation to the cognitive capacity that it triggers.⁸ A non-obvious trigger is one that is not obviously related to the capacity that it triggers. As applied to cognitive science, this would mean that the trigger does not carry any information that is associated with the cognitive capacity that it triggers. (If it did, it would be quite obvious that the input and output are related since the standard way of identifying inputs in cognitive science is in terms of their informational content.) The situation that G&M seem to envisage is one in which the cognitive capacity may need highly specific environmental conditions to become manifest, but where these conditions do not provide information that is relevant to the resulting cognitive competence. But I would argue that if they do not provide such information, then they are informationally impoverished with respect to that competence, and they cannot alter our assessment of the degree of innateness of that cognitive capacity. Simply put, non-obvious triggers, in this sense, contain no relevant information so they cannot alter our judgment as to whether the environment is informationally impoverished or not.

A hypothetical illustration may make this clearer. Suppose we have determined that birds of a certain species can develop species-typical adult song when reared in acoustic isolation. We conclude on this basis that these birds have a significant innate endowment when it comes to birdsong. Now suppose we discover that they do not develop this capacity unless they have a certain level of testosterone in their system; if levels of testosterone are depleted, then they do not develop birdsong (whether reared in isolation or not). What happens to our judgment of innateness once we discover this non-obvious trigger? Surely, we would maintain that the capacity for birdsong is innate but that it also requires specific environmental factors to become manifest. The reason our judgment of innateness remains unaltered is that the testosterone does not contribute anything in terms of informational content. The same is true for the judgment that a cognitive capacity is *not* innate. Suppose we discover that birds of another species do not develop normal adult birdsong unless they are tutored by conspecifics. We conclude on this basis that birdsong in this species is learned and consists of little or no innate endowment. Now suppose we go on to discover that in

addition to tutoring by conspecifics, these birds also require certain levels of testosterone to develop adult song. Again, there should be no change in our assessment that song in these birds is largely learned (i.e., non-innate), since the testosterone does not provide any informational content required for learning song. Either way, the existence of a non-obvious trigger does not alter our judgment concerning innateness, precisely because non-obvious triggers are ones that are devoid of relevant informational content.

It is worth acknowledging that one sometimes encounters real situations that are more complex than the two just sketched. In one actual case (mentioned in Ariew, 2006; see Gardner, Naef, & Nottebohm, 2005), canaries develop normal adult song after being tutored for 6 to 8 months before reaching adolescence, but they also develop normal adult song in the absence of tutoring provided they have heightened levels of testosterone at adolescence (as is normal for that species). Researchers discovered this by tutoring them in isolation with computer-generated songs that violated the standard rules for adult canary song. The birds were able to learn these songs and reproduce them accurately, but expunged them from their repertoire and adopted normal adult song after reaching adolescence as a result of heightened testosterone levels in their system. This is a trickier case because it would seem as though Mother Nature has hedged her bets by instituting two pathways for developing adult song. Canaries are typically tutored by conspecifics before adolescence and develop song as a result, but if not, their levels of testosterone are boosted at adolescence and song develops anyway (presumably, this guards them against learning incorrect songs or not learning at all). It may seem like a waste from an evolutionary point of view to enable the canaries to acquire birdsong in both ways, but Mother Nature is a satisficer rather than an optimizer. In this case, it seems safe to say that even though the canaries are capable of learning adult song, it is innate in them after all, since they can acquire it without any tutoring in informationally impoverished circumstances. This judgment does not seem controversial. The innate disposition exists in these birds, though it is normally causally preempted by tutoring, and the disposition might not have been discovered were it not for experimental intervention.

There is a related problem that G&M raise for the canalization account of innateness that can also be raised for the triggering account. When it comes to the acquisition of a trait like birdsong, there are many relevant factors that might contribute to the acquisition of the trait in different species, and these factors are not directly comparable. In some species, birds may need brief exposure to the song of conspecifics in order to acquire it, in others they just need to listen to some song or another to acquire the song of their own species, and in yet others they just need to be socially reared. These environmental conditions are all impoverished in some way relative to the output. So in which of them is birdsong innate, and in which is it learned? There seems to be a measure of innate endowment in all three conditions, each in its own way. G&M's objection seems to be that there will generally be a different answer for each condition, and that this would render innateness multiply ambiguous. We would be unable to answer the question as to whether some cognitive

capacity C is innate without specifying the condition relative to which innateness is being assessed, for example exposure to conspecific song, social rearing, and so on. This objection may be thought to be addressed by relativizing judgments of innateness to specific environmental conditions. Each condition can be regarded as an axis, and the three species in question might be plotted against each of these axes, depending on whether (or the degree to which) these conditions must be satisfied in order for birdsong to be acquired. With regards to such a response, G&M say that such relativization to axes would be acceptable “if [some] particular axis of variation in the developmental patterns of birdsong were the only one, or was one of a few common axes of variation, or if there were some correlation between different axes of variation” (Griffiths & Machery, 2008, 403). However, they do not seem to think that there is generally just one or a few axes when it comes to each cognitive capacity. They also hold that this move would not enable us to make comparative assessments of innateness among different species, since different axes are generally relevant to different species.

In response to this objection, I would argue that there usually *are* a few salient axes for each cognitive capacity, and the choice of axes is not arbitrary, since it is determined by their specific relevance in terms of informational content. Thus, when it comes to birdsong, exposure to species-specific song is an obvious axis along which to plot different species. Similarly, when it comes to language acquisition in humans, exposure to natural language, or to some specific aspects of language, is and should be our primary focus when discussing innateness. To be sure, for some cognitive capacities, there is more than one plausible candidate, as in the example of birdsong. As G&M rightly point out, when we do have different axes or different types of impoverishment, different species cannot always be directly compared since the axes are generally orthogonal to one another. Species A may develop normal song when deafened but not when isolated from conspecifics, while species B may do so when isolated from conspecifics but not when deafened. This makes it impossible to compare degrees of innateness for these species independent of any axes. But provided we bear in mind that judgments of innateness are always made, whether implicitly or explicitly, relative to some axis or another, this should not lead us to abandon the concept altogether. More importantly, it is crucial to remember that when we are dealing with informational content, we can compare input *directly* to output to determine whether there is an informational deficit, without needing to compare the same cognitive capacity in different species or different cognitive capacities in the same species. Hence, the need for inter-species comparison is diminished when it comes to cognition simply because information is involved.

Finally, G&M might concede that the concept of innateness can be given a satisfactory explication in the domain of cognition, but might still maintain that it is *methodologically* problematic. They say that the concept of innateness is an “anti-heuristic which encourages researchers to check the obvious sources of environmental input, and then to stop looking.” (Griffiths & Machery, 2008, 405) We have already seen that non-obvious environmental triggers will not change our assessment

of innateness, at least if “non-obvious” is roughly equivalent to “not informationally relevant.” But there may be another, more subjective sense of “non-obvious” triggers, namely triggers that are hidden from investigators in the context of inquiry. G&M suggest that the reason that such triggers might not be apparent may have to do with the concept of innateness itself. They claim that having settled the question of innateness, we will not see the need to investigate further to determine the precise causal pathways that are implicated in the development of a particular cognitive capacity. Indeed, there may be cases, such as that of the canaries described earlier that will evade detection altogether, since once we discover that the capacity for species-typical birdsong can be triggered in these birds without instruction, we will conclude simply that it is innate, and will miss the fact that it is innate only in the event that it is not taught. We will then fail to investigate the bio-feedback mechanism which enables the bird’s system to “know” that it has not acquired typical song by adolescence and will thereby miss an important scientific discovery.

This criticism seems to assume that when researchers deploy the concept of innateness, they will become blind to all other aspects of the relationship between the organism and the environment. But it is not clear why the investigation of claims concerning innateness would deter the search for such factors. If investigators have determined that a cognitive capacity is innate, there may still be a whole host of environmental factors that need to be in place before it can be acquired, and if investigators have concluded that it is not innate, there may still need to be other factors involved in its acquisition beyond those needed for learning. In fact, given that the triggering model implicitly recognizes the complexity of the organism-environment relationship by acknowledging that triggers may carry no relevant information to the acquired cognitive capacity, it is unlikely that this model of innateness would be involved in covering up environmental conditions that are causally efficacious in development.⁹ Consider the flurry of studies on object permanence in infants and related cognitive capacities, such as object continuity and cohesion. The “habituation paradigm,” which was first devised to gauge the extent of innate endowment in these domains, has clearly not ignored the possibility of manipulating various aspects of the environment to determine which conditions are relevant to the acquisition of a cognitive capacity. Indeed, recent studies indicate that some innate cognitive capacities in infants can be temporarily induced by researchers in the lab at an earlier stage of development than they are normally acquired if infants are exposed to certain types of information. For instance, infants can be temporarily “induced” to detect continuity violations in certain variables at an earlier age than they would normally do if they are primed with events in which those variables are manipulated. Baillargeon reports that “infants who fail to detect a continuity or change violation in an event, because they have not yet learned to include the necessary information in their physical representation of the event, succeed in detecting the violation if induced (through contextual manipulations) to represent the information” (2008, p. 3). Such findings show how infants can learn to identify some violations before they ordinarily do so by manipulating the environment in such a way as to render those kinds of violations salient. In short,

there is no reason, having settled the issue of innateness, to ignore other aspects of the organism-environment interaction and leave it at that. It is unlikely that the concept of innateness itself would have the effect of squelching further inquiry, and evidence from the research programs of investigators who use the concept of innateness indicate that it does not.

2. Folk Notions and Scientific Concepts

In critiquing the folk concept of innateness and pronouncing it unsuitable for scientific inquiry, G&M say that they “are drawing the attention of philosophers such as Ariew and Khalidi to a long and substantial tradition of scientific criticism of the research strategy they have identified [viz. an attempt at a rational reconstruction of the concept of innateness]” (Griffiths & Machery, 2008, p. 402). Specifically, G&M take themselves to be building on a body of work in developmental biology that finds the concept of innateness to be detrimental to the progress of science. Thus, they do not regard themselves as philosophical outsiders who are “flying in the face of scientific success” in recommending the abandonment of a perfectly good scientific concept. This raises a question as to when a folk concept is detrimental to scientific progress and when it can and should be rehabilitated to serve a useful scientific purpose. Though there is not likely to be a general answer to this question, I will try in this section to argue that we should adopt a policy of retention rather than elimination in the case of our folk concept of innateness, specifically when it comes to the science of cognition.

The main reason for retaining our folk notion, while revising it, is that G&M have not supplied adequate reasons for thinking that our folk notion is incompatible with the scientific concept of innateness that I articulated in the previous section. Someone might find the triggering model defended in the previous section to be viable, yet maintain that it does not correspond to the folk notion of innateness. It may be argued that the concept that I have put forward is distinct from the vernacular concept of innateness and should not be conflated with it. In support of this contention, it might be said that G&M’s experimental work on our folk notion of innateness shows that it is ambiguously related to three features: *typicality*, *fixity*, and perhaps *teleology*. However, the fact that the folk concept is often associated with these three features does not render it incompatible with the account put forward in the previous section. G&M have not shown that the folk notion is *not* associated with other features, including the notion of being capable of being triggered that is central to the triggering model. It may be that the folk concept of innateness is a cluster concept, which would make it no different from many other vernacular concepts. When the vernacular concept is put to more precise use in some branch of science, a subset of this cluster of descriptions may be selected as particularly salient and may form the core of the scientific concept. Moreover, even if the original cluster was only loosely associated with the vernacular concept rather than providing necessary and sufficient conditions for its application, that would not render the concept unfit for

science, since necessary and sufficient conditions cannot be supplied for many scientific concepts. The history of science is full of examples of terms that had a folk usage, which may have been vague or ambiguous, that were later taken up by science and given a related and more precise meaning. Carnap's notion of explication is again instructive in this context. He summarizes four characteristics of explication—the transformation of a “prescientific” concept into a scientific one—the first of which states that the explicatum (what explicates) is to be similar to the explicandum (what is explicated), even though “considerable differences are permitted” (Carnap, 1950, p. 7).

Carnap's first condition on an adequate explication immediately raises a question as to whether the triggering account is indeed similar enough to the folk concept of innateness. One might ask: at what point are we merely elaborating on the vernacular concept and at what point have we introduced a new concept altogether? The answer to this question depends on the answer to a more general question concerning concept identity, which I will not try to settle here. However, on most philosophical accounts of scientific concepts, theoretical concepts in science are not individuated by a set of necessary and sufficient conditions that remain attached to them come what may. In discussing the structure of the vernacular concept above, I referred to the possibility that it might be a cluster concept. The same may go for the scientific concept. Though the cluster account of scientific concepts is no longer held in high regard among philosophers of science, a related account is more plausible, which regards scientific concepts as being individuated by the role they play in a scientific theory. What I said above about clusters of descriptions can be reconstrued in terms of such an account, if one bears in mind that these descriptions are themselves constituted by concepts that play a role in our scientific theories. Hence, my claim is that the vernacular concept of innateness played a theoretical role in theorizing about the mind that is similar to the role played by the scientific concept as it is deployed in recent cognitive science. That is because traditional claims of innateness on behalf of various aspects of the mind have often been made on the basis that there is insufficient basis upon which to acquire them by learning, that is, that they can be acquired on the basis of an impoverished stimulus. But I have already argued that the poverty of the stimulus argument is closely related to the triggering model of innateness that can be found in many discussions in cognitive science. As Samet states: “one could argue, following Whitehead's famous remark, that all the key elements in subsequent Nativist theorizing are anticipated in Plato. Especially important is . . . the *form* of argument (now termed the *poverty of the stimulus argument*): some *x* must be innate because of the *inadequacy* of sensory experience” (2008, section 3). Given the natural affinity between the triggering model of innateness and the argument from the poverty of the stimulus, and given that the latter has been a mainstay of discussions of innateness since Plato, I would argue that the concept of innateness that I have been defending is closely related to the vernacular one and plays a similar theoretical role.

It might be protested that this kind of exercise, if pursued elsewhere in psychology or cognitive science, might lead to the rehabilitation of any number of discredited

mentalistic folk notions. Why not resuscitate the doctrine of the four temperaments (choleric, sanguine, melancholic, and phlegmatic) by saying, for example, that there is such a thing as a choleric temperament and identifying it with the manic phase of bipolar disorder? There is an important difference between the two cases, since the concept of innateness never completely dropped out of the study of the mind,¹⁰ whereas the doctrine of the four temperaments has. Innateness seems to have been continuously present in systematic inquiry into human cognition for at least two and a half millennia, so it does not need resuscitation as much as rehabilitation. Moreover, there is no evidence that use of the concept of innateness is on the decline or that inquiry into the innateness of one or the other aspects of the human cognitive repertoire represents a degenerative research program. Journals in psychology and cognitive science are full of lively debates about whether one or another cognitive competence is innate for human beings and researchers on both sides of the debate seem to know what they are arguing about for the most part.¹¹

At this point, G&M may object that, on the triggering model, innateness is a dispositional property, and dispositional properties are sometimes reduced to their categorical bases. Hence, they might argue that equating innateness with a dispositional property would not guarantee its retention in the long run. However, it would be very precarious for G&M to rest the claim of eliminating innateness on the possibility of reducing dispositional properties. If, as has been widely argued, mentalistic and psychological properties are generally multiply realizable,¹² then one might be able to effect a restricted reduction of some of them to certain types of cognitive system. On this scenario, in each type of cognitive system, we would discover that the very same neural or genetic mechanisms underlie all innate cognitive capacities. Still, what would unify all such capacities is the property that they all share, namely a tendency to become manifest on the basis of impoverished input. This property is important at the psychological or mental level of description, and it is not likely to be traded in for a motley group of physiological ones, even though we may be very interested to know in each type of case what are the physiological processes that lead to their manifestation on the basis of an impoverished input. Thus, a restricted or functional reduction of this sort would not lead to the elimination of the psychological property¹³. Indeed, even if the psychological property of innateness turned out not to be multiply realizable and even if it could be completely reduced to some lower-level property, that still need not lead to its elimination. Dispositional properties are often retained when their categorical bases are known because they enable us to capture generalizations that would otherwise be lost at a lower level of description. In the event of such a reduction, some researchers would no doubt be interested in investigating the next level down and would launch an inquiry into the underlying causal mechanisms of innateness. But lower-level investigations do not always displace the higher-level study of the properties they reduce. Thermodynamics continues to be a thriving science even though its basic properties have allegedly been reduced to statistical mechanics.¹⁴

In this section, I have tried to argue that G&M have not demonstrated that the triggering model of innateness, which was defended in the previous section and seems prevalent in cognitive science, is incompatible with our folk notion of innateness. In the absence of such a demonstration, it remains open to us to rehabilitate the folk notion of innateness for use in scientific theorizing, provided it is explicated more precisely in terms of the triggering model.

3. Conclusion

I have argued that the triggering model of innateness, which applies to innate cognitive capacities but not to innate traits more generally, can escape the objections leveled against it in Griffiths and Machery (2008), and that it provides a theoretical explication of a concept of innateness which can perform a useful function in cognitive science. I have also tried to show that the concept of innateness that can be explicated in this way is compatible with the vernacular concept of innateness, and that the triggering analysis may capture at least part of what is meant by innateness in folk psychology. The upshot of this discussion is that holding on to the concept of innateness is a more useful research strategy in cognitive science than eliminating it, as G&M recommend.

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Notes

- [1] Since a more general defense of the triggering model of innateness can be found elsewhere (see the references mentioned in the text), I will confine myself here mainly to defending it against the considerations brought forth by G&M.
- [2] There are also other ways in which the degree of innateness can be assessed. For instance, if birds from species A acquire imperfect song in the absence of exposure to normal adult song, while those from species B acquire perfect command of adult song in that condition, then we can say that birdsong is more innate in B than in A, even though environmental conditions are more or less the same. For further details, see Khalidi (2007).
- [3] Carnap characterizes “explication” as follows: “the transformation of an inexact, prescientific concept. . . into a new exact concept” (1950, p. 3). However, I do not think that this process always results in a “new” concept, since depending on one’s account of conceptual identity and individuation, the resulting concept may indeed be the same. (For more on this point, see section 2.) This type of theoretical explication seems different than either of the two alternatives that G&M consider with respect to Ariew’s account: “conceptual analysis” or “identification” that “provides the basis for a promising scientific research strategy” (Griffiths & Machery, 2008, pp. 399–400).

- [4] Ariew (2006) states that an adequate account of the human linguistic capacity should capture relevant developmental differences between traits that are independent of linguistic cues and those that require some linguistic cue or other, whereby the cue is too impoverished to explain the output. Here, Ariew incorporates triggers into the account of innateness, but I would argue that if the canalization account is modified to focus on the “cues” that “initiate” canalized pathways, then it will have moved in the direction of the triggering account.
- [5] Another significant difference between the triggering account and the invariance account is that the latter leans heavily on the notion of “normal” environments to explain why some innate traits do not emerge in a wide range of environments that happen not to feature the specific conditions needed to lead to the emergence of those innate traits. Since some such environments would otherwise be considered quite normal, it can be argued that the unexplicated notion of normalcy is doing too much work in this account. The problems with this reliance on normalcy have been elaborated in Khalidi (2002, 2005). By contrast, the triggering model can make do with an innocuous notion of normal conditions (inserted in the form of a *ceteris paribus* clause), which can be interpreted as: conditions necessary for acquiring any cognitive capacity at all (cf. Stich, 1975).
- [6] For a particularly clear explication of the argument from the poverty of the stimulus when it comes to the acquisition of human language, see Pullum and Scholz (2002). The authors explicitly identify the data that would be needed for learning as the “lacuna” and hold that if it is to succeed, the argument needs to show both that such data are indispensable to learning and that the data are inaccessible to the subject.
- [7] I am grateful to an anonymous referee for raising this point.
- [8] Later in this section I will entertain a more subjective construal of “non-obvious,” in considering whether the concept of innateness is methodologically problematic in that it discourages researchers from looking for triggers beyond the ones that they would usually expect.
- [9] I owe this point to an anonymous referee.
- [10] This is certainly not to suggest that all those who have theorized about the mind since Plato have been nativists. However, even arch empiricists have been concerned to counter claims of innateness.
- [11] A search of the PSYCINFO database between 1995 and 2007 reveals that the number of articles published annually that contain ‘innate’ as a keyword rose by 75% during this period. Even allowing for a substantial increase in the number of articles published annually over this period, this is still a very significant increase.
- [12] In a sense, this is an optimistic scenario. In Khalidi (2005), I have argued that many psychological properties may crosscut lower-level ones rather than be multiply realizable by them. The same may go for innateness.
- [13] For more on functional reduction, see Lewis (1972).
- [14] Although it is usually cited as the textbook case of reduction, the extent to which there has been a genuine reduction is in dispute among philosophers of physics.

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