[1]MODULARITY AND THEORY OF MIND

By Carl Hildebrand

Abstract:

In "Generous or Parsimonious Cognitive Architecture? Cognitive Neuroscience and Theory of Mind" Philip Gerrans and Valerie Stone claim that it is unwarranted to postulate a Theory of Mind (ToM) module because ToM abilities may instead be attributed to the emergent outcome of the interaction between a host of lower level, domain-specific and higher level, domain-general systems. However, in their parsimonious account of ToM, they make a number of claims about what a module can and cannot be—claims that I would like to contest. For it is my argument that modularity may be defined in such a way that it accounts for Gerrans and Stone's interpretation of the evidence surrounding ToM modularity and their criticisms of it; I contend that their definition of modularity is too narrow and as a result, it causes them to prematurely forfeit the possibility of a ToM module. I will argue instead that a ToM module may be defended within a massively modular account of cognitive architecture and I will briefly outline what a ToM module might look like within such an account.

1.0 Introduction

In "Generous or Parsimonious Cognitive Architecture? Cognitive Neuroscience and Theory of Mind" Philip Gerrans and Valerie Stone examine the case of childhood autism in order to make claims against the possibility of a Theory of Mind (ToM) module.[2] They claim that instead of postulating a distinct ToM module, it is possible to account for ToM abilities on a more parsimonious scheme of cognitive architecture and among other things, without a ToM module. They claim instead that ToM abilities may be attributed to the emergent outcome of the interaction between a host of lower level, domain-specific and higher level, domain-general systems.[3] However, in order to make theirs an emphatically parsimonious account and to

consequently rule out a ToM module, they make a number of claims about what a module generally can and cannot be. These are claims that I would like to contest.

For I believe that the modularity thesis may be defined differently than the way Gerrans and Stone define it, so as to take stock of their interpretation of the evidence surrounding ToM modularity and their resulting criticisms of it. Thus I will reexamine the modularity thesis in light of some of their claims and argue that their definition of a module and implicitly, their definition of the modularity thesis is an inappropriately narrow one. As a result, their argument prematurely forfeits the possibility of a ToM module. I will also argue that the existence of a ToM module may be defended within a massively modular account of cognitive architecture. To articulate such a massively modular account I will look primarily to the work of Peter Carruthers in his book *The Architecture of the Mind.* Additionally, in order to defend the ToM module from the criticisms of Gerrans and Stone, I will also consult some more traditional definitions of modularity such as that of Jerry Fodor in his highly influential book *The Modularity of Mind.* Thus in Section 2 of this paper I will defend a massively modular account of cognitive architecture and the ToM module in light of the claims made against them by Gerrans and Stone. Then in Section 3 I will briefly put forward a positive account of what a ToM module might actually look like before I consider what I take to be a significant objection to my overall argument in Section 4.

2.1 On the Alleged Necessity of Domain General Systems

As Gerrans and Stone make it clear at the beginning of their article, they intend to account for what has previously been known as the ToM module in terms of the "interaction of several domain general mechanisms and lower-level domain specific mechanisms."[4] But this assumes the existence of domain general mechanisms or systems from the beginning - something unnecessary and even disagreeable according to the massive modularity theorist. However, perhaps it could be answered in favor of Gerrans and Stone that they are only assuming the most common or traditional scheme of the modularity of mind likely stemming from Jerry Fodor's work in *The Modularity of Mind*. Even so, they go on to claim that the presence and nature of such domain general capacities is a point of agreement amongst all ToM theorists.[5] This is significantly more problematic because it excludes a massively modular account of the mind from the discussion surrounding ToM right from the beginning. As a result, the language and conceptual scheme that forms the background of Gerrans and Stone's argument is already slanted in their favor by limiting the scope of what modularity can mean in the first place.

On this point Peter Carruthers offers a plausible modular account of such allegedly domain general abilities as learning and belief-fixation[6] in contrast to, for example, Fodor who allocates belief-fixation to domain general or central systems in the mind.[7] Carruthers consults a number of studies conducted on animal populations in order to argue that "learning is a modularist process through and through."[8] One such study involves a flock of ducks that is able to redistribute themselves according to changes in the feeding frequency of two different feeders in a very short period of time (only one minute).[9] This suggests that the ducks are able to calculate and represent rates in a highly effective, speed efficient manner and hence possess a specialized numerosity module. This is important evidence because it challenges the standard associationist explanation, an explanation that employs the existence of domain general systems,

to claim that the ducks are conditioned to respond as they do; for it is argued that such conditioning could simply not occur in such a short period of time.[10] Alternatively, the evidence indicates that the learning occurring on the part of the ducks in this case is a modular event. This particular example forms a part of Carruthers' overall argument for the massive modularity of the human mind on the basis of the structure and nature of animal minds.

If one can then grant that, as a generally conservative process, evolution will modify yet preserve these structures in the human mind, it can then be expected that the human mind too will exemplify modular structure and characteristics in the case of learning and other purportedly domain general abilities. In this way, the concept of the module can be pushed higher up in the cognitive system to where domain general mechanisms were previously exclusively thought to exist. If it is the case that most or all higher cognitive systems are modular, it is already more probable that other middle or lower level systems will be modular as well.

2.2 Domain Specificity, Neural Circuitry, and Evolutionary Psychology

In "Generous or Parsimonious Cognitive Architecture?" as well as in other articles written by the authors,[11] Gerrans and Stone state domain specificity as an important condition for a ToM module.[12] Interestingly, they qualify this statement by adding that domain specificity as such, remains most important primarily to domain specific theorists.[13] But this begs the question of whether it is then left open for non-domain specific theorists to disagree with domain specificity while retaining the concept of a ToM module. Gerrans and Stone do not answer this question; nonetheless, they proceed throughout the remainder of their article to recruit the lack of domain specificity in a ToM module as support for their "cautionary tale to evolutionary

psychologists and modular theorists... [not to postulate] more modules than are warranted by the data."[14] To clarify this matter, I will argue in this subsection that domain specificity is not a necessary condition for a ToM module or any module in particular though it may be common to most. Rather, the wiring up of dispersed neural circuitry may constitute a module in order to fulfill a specific functional role in the overall fitness of the organism. Thus we will see that on this count as well, the modularity thesis not only remains invulnerable to the criticisms of Gerrans and Stone but may also account for them in a positive way as well.

In their article, Gerrans and Stone specify that domain specific ToM theorists regard the ToM module as a "domain specific cognitive adaptation that depends on the genetically guided maturation of specialized neural circuitry... and [i]t is for this reason that the near-universal presence of ToM in the human phenotype has been recruited by Evolutionary Psychology as evidence for domain specific nativism."[15] But they go on to claim that their more parsimonious mental architecture can equally account for such specialized neural circuitry in non-nativist conditions - nativism here referring to the requirement that such circuitry be innately predetermined.[16] Thus they account for the neurological basis of ToM as the wiring up of distributed metarepresentational circuitry with social information as input.[17] According to them it then follows that there is no need to postulate a distinct mechanism or module in order to account for the neurological system and its goings-on. On the contrary, deficits in ToM tasks may result from deficits in either higher level, domain general or lower level input systems and not necessarily a distinct ToM mechanism or module.[18]

It seems here that the main point that Gerrans and Stone are trying to make is that domain specific *nativism* is not necessary in order to account for the function of the ToM module. However, we can concede them this point without sustaining any damage to the modularity and

specifically the ToM modularity thesis. In his argument for the massive modularity of mind on the basis of evolutionary design, Carruthers argues that modules can be associated with specific neural structures that are nonetheless spatially dispersed. He points out that modules are biological systems that have been built incrementally over an incredible period of time by the processes of evolution and as a result of this, combined with the fact that evolutionary processes can only possibly work with whatever resources or materials are antecedently available, the systems they produce may have a very awkward and untidy appearance.[19] In other words, such systems will exhibit a massive and messy looking sharing of parts wherever possible in order to maximize the use of limited resources - in order to make the best of what's around, so to speak. Yet these resource constraints and their consequent effects on cognitive systems do not imply that the brain will be any less modular than any other biological system.[20] They simply imply that a particular module will have such and such a neural representation without saying anything crucial about its function or its definition.

For cognition occurs in the mind and the mind, although highly complex, is nonetheless a biological system like others and has been shaped most significantly by the forces of evolution. As a result, it models the same characteristics of other biological systems that have been similarly constructed for the sake of an organism's fitness. Being incredibly complex and specialized, the mind is arranged in the fashion of a hierarchy of abilities from those that are more basic to those that are more complex.[21] ToM, however construed, is certainly one of the more complex abilities that the human brain possesses, as other than potentially being shared with some few primates, it remains a distinctly human feature.[22] Yet over the developmental history of cognition and its progressive movement up the hierarchy of abilities/functions, it becomes decreasingly likely that a precise spatial location and isolable or discrete system will be

found for that ability or function. The further that an organism progresses away from the most basic of functions, the more creative evolution will have to become in finding new ways to wire together the more specialized lower level subsystems into more general (and advanced) unified systems. Thus many function-specific systems may exhibit significant overlapping and close dependence upon one another while retaining their functionally distinct operation.[23] Furthermore, this remains consistent with the fact that such systems are to some degree dissociable along the lines of the particular function or set of functions they perform; Carruthers says that such systems are like modules in the everyday sense of the term, much like the dissociable components of a hi-fi stereo system.[24]

The important thing about these systems or modules is that they are not necessarily tied to a specific perceptual modality but may receive and compute over input from a variety of other systems while performing their specific function and retaining their dissociable nature. Thus a ToM module may precisely consist of the "wiring up of distributed metarepresentational circuitry which can take social information as input and, ultimately, compute over abstract representations of mental states not tied to a perceptual modality."[25] In this way, a ToM module sounds strikingly similar if not identical to the purportedly parsimonious account of ToM capabilities given by Gerrans and Stone, thus taking account of their criticism while firmly upholding the massively modular account of the mind.

2.3 Modules as Assembled and Acquired

The idea of a module being assembled picks up and expands on the question of the innateness of modules and the possibility of their being assembled from more specialized, lower

level cognitive subsystems. In this subsection, I will argue that certain modules responsible for more general and therefore more advanced (in evolutionary terms) tasks may indeed be assembled from such lower level systems, themselves modular by definition. Furthermore, I will argue that it is possible that certain modules be acquired postnatally, or after birth, in and through the process of learning, without being innately predetermined. This will again suffice to answer Gerrans and Stone's criticisms of previous accounts of the modularity thesis and the ToM module in particular, by offering an alternative definition that does not require that a module necessarily be "genetically specified."[26]

However, it is helpful to first take note of the fact that the traditional Fodorian definition of modularity may itself allow for the postnatal acquisition of at least some modules. In "Modularity and Cognition" Max Coltheart examines Fodor's conception of modularity and points out that some modules may be innate while others are not. He refers to the example of reading and writing modules which cannot be innate because these "abilities are too new in evolutionary terms, and not ubiquitous among current members of the human species."[27] In light of this example and the fact that ToM is a similarly advanced and novel ability (in evolutionary terms) it is then possible that a ToM module in particular need not necessarily exhibit innate cognitive structure. Yet importantly, this lack of innateness need not violate its modular structure or definition. Coltheart proceeds to point out in his article that the question of whether a module (in our case, a ToM module) is innate or assembled is finally an empirical question.[28] For a module may itself have an internal modular structure, consisting of multiple specialized submodules, without violating even Fodor's concept of information encapsulation, which he maintains is crucial to the definition of modularity.[29] It is helpful to note that Fodor defines information encapsulation as the requirement that information at higher levels of representation

(ie: at the level of domain general or central systems) not be available to the lower level (modular) input systems.[30] Therefore, we see that even according to Fodor's more traditional and strict definition of modularity, a module may nonetheless be assembled of smaller modular subsystems. As a result, we can infer that Gerrans and Stone's stipulations that a module be innate or genetically hardwired rather than assembled[31] are too stringent even along the lines of the traditional modularity thesis and their case against the ToM as such does not so much harm the prospect of a ToM module. The ToM module may remain functionally specialized though much less structurally and mechanically distinct.

How then does Carruthers' massively modular scheme, on the other hand, cope with the prospect of an assembled module? First of all, it helps to reiterate that what abilities Fodor, for example, accounts for in terms of domain general or central systems, Carruthers will account for in terms of modular systems. As already discussed, he understands the mind to be a biological system designed for learning according to its having been shaped along the lines of evolutionary processes. Thus when it comes to the skill of learning, the mind will possess multiple learning modules.[32] Nonetheless, the information that it processes will be encapsulated in a similar way to Fodor's modules as also previously discussed.[33] Therefore, Carruthers' modules and consequently, a massively modular account of a ToM module, may be assembled without being any less modular in definition.

However, in Carruthers' massively modular account we can go one step further to claim that a module may not only be assembled but postnatally acquired or learned. For Carruthers argues that the components of acquired skills are organized hierarchically out of motor-control systems that are themselves constructed in and through the learning process.[34] This allows that the various learning systems of the mind be realized in a distinctly modular structure while the

products of these systems be realized in further modular structures.[35] Overall, this adds an increasingly numerous and complex modular structure to the architecture of the mind in the case of skill acquisition. Furthermore, it importantly allows that a module be acquired postnatally, independent of the constraints of a nativist account or any other account that requires a module be genetically hardwired.

In the case of a ToM module, the above well accounts for the claims of Gerrans and Stone that ToM abilities result from the interaction *in development* of the lower-level input systems with higher-level capacities.[36] For Gerrans and Stone take as their opponent those who hold that ToM deficits result from the impaired development of a "discrete cognitive entity implemented in specialized neural circuitry."[37] Whereas I hope to have shown that alternative renderings of the modularity thesis can do without such a discrete entity while all the while retaining an ability or capacity as modular in definition. Accordingly, ToM abilities and systems too may continue to be considered modular in character without being discrete cognitive entities.

2.4 Modules as Function-Specific

This leads naturally to the question that, if a module may be spatially dispersed and postnatally acquired, among other things, what distinguishes it then as a module? In this subsection I will argue that in addition to being informationally encapsulated, a module may be distinguished notably by its function-specific capabilities or performance rather than its being a domain specific, innate, and local cognitive mechanism. In this way, it can be shown that Gerrans and Stone miss an important aspect of modularity in their critique of ToM modularity

and modularity in general and that consequently, the modularity thesis remains able to account for ToM abilities in the form of a ToM module.

In the case of learning, it has been shown by Carruthers that a given set of modules do what a general learning system cannot—they perform numerous parallel and specialized computational tasks in order to solve a given problem or problems.[38] Where a general learning system would have to process each problem independently and sequentially, handling no more than one task at a time, a set of modules can process a vast number of problems simultaneously. This is a part of Carruthers' argument from parallelism, where he argues for the existence of multiple learning modules (hence massive modularity) on the basis of the implausibility of a single general learning mechanism's being able to process information frugally.[39] Thus we observe that a module's primary purpose is to run task-specific processing algorithms with distinct input and output connections in order to issue in adaptation-conducive beliefs about some aspect of the environment and thereby contribute to an organism's overall fitness.[40] This being a module's most significant role or responsibility, it is also a crucial component of its definition qua module and as such, requires no cognitively isolable or neuroanatomically localized region in the brain. Rather it is defined qua module along functional lines, in terms of performance - its inputs and outputs and its resulting role in the overall fitness of the (in the case of ToM, human) organism.

It is helpful in this context to reiterate the point that Coltheart makes in saying that it is not necessary that a module be associated with localized fixed neural architecture.

> If, however, it had turned out that in people with selective cognitive deficits one could never attribute the deficit to damage in some specific and localized region of the brain, that would just be an empirical fact about the neural representation of

> cognitive modules, not evidence against the view that the mind has modules. It would be relevant to some concept of neuroanatomical modularity, but not to the concept of cognitive modularity.[41]

Regarding the question of a ToM module, this line of reasoning aptly applies. For in the ToM module, the essence of its being a module lies in its task- or function-specific role as a system which computes over representations of mental states which are in turn drawn from inputs of metarepresentational and social information.[42] As such, it retains its modular definition in spite of possessing a dispersed or even undefined spatial location in the brain.

We may also expand on a module's positive definition as function-specific by attributing to it the characteristic of wide-scope encapsulation as Carruthers does in his account of massive modularity. Unlike the more rigid information encapsulation of Fodor's modules, wide-scope encapsulation does not demand a determinate subdivision of what information can and cannot be available to a module in the course of its processing.[43] Instead, it allows that a module may employ frugal search heuristics to consult information spread throughout numerous and extensive databases or send queries to other systems for information.[44] This shifts the definition of a module further away from a determinate and easily locatable body of information to one that is significantly dispersed and increasingly defined by its function as a result.

In addition to being wide in scope, the definition of encapsulation also admits of degrees. For Carruthers maintains that the inaccessibility of a module's internal operations does not mean that all *information* generated in the course of a module's processing is unavailable elsewhere; rather it means that the internal *processes* of a module are inaccessible to other systems.[45] On the contrary, we should then expect that the information generated in a module's processing should be available to certain other systems, especially when it is the case that the module in question is further composed of a number of smaller, more specialized submodules.[46] As already discussed,

this likely applies in the case of a ToM module where the ToM module itself may be subdivided into further modular systems. It also dovetails naturally with Carruthers' previously mentioned argument from design, where biological systems are observed to have been built incrementally by the processes of evolution. In any case, this sharing of information underscores the main point that a ToM module may exhibit significant sharing of parts and information while retaining its modular definition, in this way accounting for criticisms made by Gerrans and Stone against the case of a ToM module.

3.0 What a Theory of Mind Module May Actually Be

If a significant portion of Gerrans and Stone's criticisms of the ToM module can actually be accounted for in a modified version of the modularity thesis, what then might the ToM module actually look like following such definitional modifications? In this section I will expand and extrapolate from some of the claims made in the previous section in order to give a brief positive description of what a new and improved ToM module might actually be.

A ToM module is most significantly a function-specific processing system. It receives input from a variety of more specialized, lower level, and domain specific modular systems likely including joint attention, gaze tracking, animacy detection, and recognition of emotional expression in combination with higher level systems including metarepresentational and social input.[47] Its special task is to perform computations over abstract representations of all of this information in a frugal or speed-efficient manner. As such a system, its function is to undergird the unique capacity to represent mental states or otherwise realize a Theory of Mind to the (human) organism in whose brain it subsists. In this way, in contrast to the more traditional

Fodorian module, it generates fully conceptual thoughts or beliefs instead of shallow, non-conceptual information. This obviously is partially a function of its existence within a massively modular framework—for within such a framework there are no domain general, central systems for it to interface with.[48]

Naturally, the above picture entails that a ToM module may also be assembled of smaller, more specialized submodules that are responsible for generating shallow informational output for the greater ToM module to process in the course of performing its own greater task. This is largely a result of the typical structure of biological systems. Over a given biological system's evolutionary history (in this case, the system being the human mind) the functionally distinct subsystems that make up its presently complete structure are assembled incrementally, piece by piece, so as not to disturb the workings of any preexisting system.[49] This allows the entire organism to continue in its day-to-day, molar level behavior undisturbed.

Moreover, this picture implies that though a ToM module may exhibit some sort of neural structure, that structure is neither innately/genetically predetermined nor spatially discrete. Rather its structure and corresponding neurological wiring will likely be spatially dispersed as a result of the module's massive sharing of parts with other cognitive systems. This is because, as already stated, the ToM module consists of the wiring up of metarepresentational and social information (among other things) as input. This (to some degree) indeterminate neurological wiring and spatial location is furthermore a result of the fact that a ToM module is an acquired or learned modular system. It is constructed in and through the process of learning and in that way it too may be shown to exhibit significant part sharing with other modular systems. Thus overall, what we have come to see is that the ToM module is something of an emergent system, sharing

much structure and information with other cognitive systems while nonetheless remaining functionally unique in the given task it performs.

4.0 A Significant Objection

It could be said at this point that the central claim I am making in this paper is not an interesting one as Gerrans and Stone have only traditional definitions of the ToM module as their target and not the ToM module as I define it. Consequently, my definition of the ToM module constitutes no more than a restatement of their definition of ToM abilities albeit in a different language—the language of massive modularity. Gerrans and Stone may even agree with my definition of a ToM module but whether or not that is the case, my argument challenges nothing in the deeper structure of their conceptual scheme. To this I would respond in two ways.

First, whether or not Gerrans and Stone have a more general definition of modularity as their target over and above the ToM module in particular, their claims about cognitive architecture being more parsimonious than generous in nature appear less convincing as a result of my argument. I hope to have shown that despite its being assembled, acquired, and wide-scope encapsulated, the ToM module in fact should be attributed to ToM abilities. This suggests that the architecture of the mind will look much more generous, to use the language of Gerrans and Stone, as it will be populated by a greater number of higher-level modules. And though a module may be neurologically dispersed and postnatally acquired (etc.) through processes that Gerrans and Stone forecast, it nonetheless inhabits a definite spot on the map of mental architecture, making that map look a lot more elaborate than Gerrans and Stone argue it is.

Second, I think it is reasonable to expect that Gerrans and Stone (or at least Gerrans) in fact do have a version of the modularity thesis as their target, although perhaps in some less direct way. In a different article, Gerrans states that "[v]indication of the project of EP [evolutionary psychology] thus depends on the discovery within our psychological phenotype of such specialized cognitive mechanisms, or modules [as the ToM module]"[50] and "if [the absence of a module concerned with social cognition] is correct EP has lost substantial support for one of its central claims, that the mind is modular at the center as well as the periphery."[51] In light of such a research program on behalf of the author(s), it is important in the context of this paper to make it clear that evolutionary psychology and the massive modularity thesis may in fact account for the existence of a ToM module. In this way, my argument in this paper goes toward defending massive modularity writ large as well as the cognitive-structural implications of evolutionary psychology from the claims or intentions of Gerrans and Stone whether evident in the article under consideration or elsewhere. In this way, I hope to have shown that any dismissal of the massive modularity thesis on account of the case of the ToM module is premature.

5.0 Conclusion

In conclusion, I have argued that if cognitive architecture is defined along the lines of the massive modularity thesis, the existence of the ToM module may be defended from the evidence that Gerrans and Stone hold against it. Following that I argued that a ToM module may be defined as an acquired function-specific cognitive system that generates conceptual output and

exhibits dispersed neural circuitry, a massive sharing of parts, and wide-scope information encapsulation. This particular account of ToM abilities contributes to a progressively rich taxonomy of mental structure and as a result, points beyond ToM abilities alone toward the possibility of attributing a much more generous cognitive architecture to the inner spaces of the mind in general.

Works Cited

Audi, Robert, ed. *The Cambridge Dictionary of Philosophy, 2nd Edition.* Cambridge: Cambridge University Press, 1999.

Baron-Cohen, Simon, Uta Frith and Alan Leslie. 1985. Does the Autistic Child Have a 'Theory of Mind'? *Cognition. 21:* 37-46.

Carruthers, Peter. *The Architecture of the Mind.* Oxford: Oxford University Press, 2006.

Coltheart, Max. March 1999. Modularity and Cognition. *Trends in Cognitive Science.* 3: 115-120.

Fodor, Jerry. *The Modularity of Mind.* Cambridge: The MIT Press, 1983.

Gerrans, Philip. 2002. The Theory of Mind Module in Evolutionary Psychology. *Biology and Philosophy.* 17: 305-321.

Gerrans, Philip and Valerie Stone. 2008. Generous or Parsimonious Cognitive Architecture? Cognitive Neuroscience and Theory of Mind. *British Journal For the Philosophy of Science.* 59: 121-141.

Gerrans, Philip and Valerie Stone. 2006. What's Domain-Specific About Theory of Mind? *Social Neuroscience.* 1:309-319.

1

2 Discussion surrounding Theory of Mind and its possible modularity was generated by a study performed on children with autism by Simon Baron-Cohen as a part of his Ph.D thesis. It was consequently published as the article by Simon Baron-Cohen, Uta Frith and Alan Leslie, "Does the Autistic Child Have a 'Theory of Mind'?" *Cognition* 21 (1985): 37-46.

3 Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture? Cognitive Neuroscience and Theory of Mind," *British Journal For the Philosophy of Science* 59 (2008): 122.

4 Ibid., 121.

5 Ibid., 127.

6 Peter Carruthers, *The Architecture of the Mind,* (Oxford: Oxford University Press, 2006), 123.

7 Jerry Fodor, *The Modularity of Mind, (Cambridge: MIT Press, 1983),* 102.

8 Peter Carruthers, *The Architecture of the Mind,* 113.

9 Ibid., 101.

10 Ibid., 101-2.

11 For example, see Gerrans and Stone's more explicit critique of the domain specificity of ToM in Philip Gerrans and Valerie Stone, "What's Domain Specific About Theory of Mind?" *Social Neuroscience* 1 (2006): 309-319.

12 Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture?", 125.

13 Ibid.

14 Ibid., 136.

15 Ibid., 125.

[16] Robert Audi, ed., *The Cambridge Dictionary of Philosophy, 2nd Edition*, (Cambridge: Cambridge University Press, 1999), 312.
[17] Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture?", 128.
[18] Ibid., 128-9.
[19] Peter Carruthers, *The Architecture of the Mind,* 21.
[20] Ibid., 25.
[21] Ibid., 15.
[22] Ibid., 108.
[23] Ibid., 15.
[24] Ibid., 17-8.
[25] Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture?", 128.
[26] Philip Gerrans, "The Theory of Mind Module in Evolutionary Psychology," *Biology and Philosophy* 17 (2002): 306.
[27] Max Coltheart, "Modularity and Cognition," *Trends in Cognitive Sciences,* 3 (March 1999): 119-20.
[28] Ibid., 120.
[29] Ibid.
[30] Jerry Fodor, *The Modularity of Mind*, 65.
[31] Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture?", 125.
[32] Peter Carruthers, *The Architecture of the Mind,* 26.
[33] Jerry Fodor, *The Modularity of Mind*, 119.
[34] Peter Carruthers, *The Architecture of the Mind,* 28.
[35] Ibid.
[36] Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture?", 122.
[37] Ibid.
[38] Peter Carruthers, *The Architecture of the Mind,* 29.
[39] Ibid., 27.
[40] Ibid., 30-5.
[41] Max Coltheart, "Modularity and Cognition," 119.
[42] Philip Gerrans and Valerie Stone, "Generous or Parsimonious Cognitive Architecture?", 128.
[43] Peter Carruthers, *The Architecture of the Mind,* 58.
[44] Ibid., 59.
[45] Ibid., 60.
[46] Ibid.
[47] These specific systems are taken from Philip Gerrans and Valerie Stone, "Cognitive or Parsimonious Cognitive Architecture?", 122. I use these systems in particular to imply that a ToM module may be held to exist in light of the conditions that Gerrans and Stone use against it.
[48] In contradistinction to Fodor in Jerry Fodor, *The Modularity of Mind,* 97.
[49] Peter Carruthers, *The Architecture of the Mind,* 26.
[50] Philip Gerrans, "The Theory of Mind Module in Evolutionary Psychology," 305.
[51] Ibid., 307.