# A Modular Account of Open and Closed Societies

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There is a long tradition in the social sciences of classifying societies into two broad categories. On the one hand, there are open class societies in which status is achieved; whereas, on the other, there are closed class societies, in which status is ascribed (Ostrander, 1982). Concomitant with this distinction between open and closed class societies , there is a wide range of correlated features such as differences in views of human nature, interest in the natural and social sciences, interest in biography and realistic portraiture, and sound historiography (Brown, 1988). Given that it is beliefs about social mobility, as opposed to real rates of social mobility, that appears to be most important in determining whether a society will be open or closed (Brown, 1988; cf. Lipset & Bendix, 1959), psychology would appear to play an important role in the way society is organized. Therefore, this paper aims to explore the psychological underpinnings of beliefs about social mobility, specifically changes in status, with reference to modern developments in the cognitive sciences.

*Open versus Closed Societies*

Numerous attempts have been made to reduce the range of observed human societies down to a more manageable number over which useful descriptive and explanatory generalizations can be made. One of the more influential dichotomies is Durkheim's (1933) distinction between mechanical and organic solidarity. Societies that are characterized by little division of labor, i.e., little occupational specialization, are held together by mechanical solidarity. In such societies, personal and social similarity form the basis of affiliation. Due to the low level of occupational specialization, the members of society are somewhat self-sufficient and there is little intrinsic self-interest in maintaining the social order. As a result, the laws of such societies are repressive as they must work against individual interest. As societies become more complex in their social structure, through the division of labor, individuals are naturally dependent upon others to provide for their needs due to their own occupational specialization. Hence, the maintenance of the social order serves individuals' interests. The laws of such societies are, therefore, less repressive and more restitutive. Whereas mechanical solidarity encourages conformity to the group, organic solidarity encourages ever greater atomistic specialization, i.e. greater individualism. In contrasting the collective with the individual, Durkheim's dichotomy runs parallel to other influential dichotomies (Ostrander, 1982). Similar distinctions can be found in Maine's (1931) contrast between *status* and *contract*, Tönnies' (1887, cited in Ostrander, 1982) contrast between *gemeinschaft* and *gesellschaft*, and Weber's (1976) contrast between *traditionalism* and *rationalism*, respectively.

One of Durkheim's (1933) more interesting arguments for present concerns is his suggestion that hereditarian ascription of status runs contrary to organic solidarity. The reason being evolutionary lag: "As these native talents are transmitted to us by our ancestors, they have to do, not with conditions in which the individual finds himself, but

those of his forefathers [p. 304]... heredity loses its hold in the course of evolution because new modes of activity are simultaneously brought about which owe nothing to its influence" (p. 309). Our evolutionary heritage does not fit us to the novel social roles that are available to us with the division of labor. By contrast, heredity is no bar to mechanical solidarity: "everyone agrees in recognizing that what characterizes a race is the existence of hereditary likeness" (p. 309). Here, as Ostrander (1982) notes, Durkheim's model overlaps with Linton's (1936) contrast between ascribed and achieved status. Ascribed status is assigned by birth right and corresponds to mechanical solidarity / status / gemeinschaft / traditionalism. Achieved status is earned and corresponds to organic solidarity / contract / gesellschaft / rationalism.

Brown (1988) draws a parallel distinction between open (achieved) and closed (ascribed) class societies and attributes a range of concomitant features to these two forms of social organization. He initially distinguished between open and closed class societies to account for cross-cultural differences in the tendency to keep sound histories as opposed to unsound mythologies, respectively. In the process, he uncovered a range of other features of open and closed class societies. The features of open class societies include "individualism; a uniform conception of human nature; biographical writing; realistic portraiture; uniform education, or educational theory as a major literary genre; a humanistic-secular orientation; an interest in social science (especially political science) and in natural science; and elaborate divination" (p. 315). Closed class societies, by contrast, feature "a racialist conception of human nature, reduced individualism, hagiography in place of biography, iconography in place of realistic portraiture, nonuniform education, hypertrophied religious and ritual concerns, little political or social science, less fanatical divination, and perhaps a lesser concern with natural science" (p. 9). To these lists can be added a relatively high and low degree of social mobility, respectively, or more precisely the idealization or minimization of social mobility, which is a central theme of Brown's thesis. Likewise, it is endoracism – distinctions drawn within society – rather than exoracism – distinctions drawn between societies – that distinguishes closed from open societies, because it movement within society, not between societies, that typically determines social mobility. It is this feature of social mobility, or more precisely beliefs about changes in status, that will be the focus of this paper.

Several important qualifications are in order here. Brown (1988) notes that in determining whether a society is open or closed, it is the fate of the majority that matters most. The presence of a hereditarily disadvantaged minority, such as the Japanese burakumin does not necessarily make a society closed. It is only when the majority of the population falls into such disadvantaged groups that a society is closed. Nevertheless, the presence of a highly restricted, hereditarily privileged family, such as royalty does not necessarily make a society closed. Nor does the fact that the women in a society might be born second class citizens make a society closed provided that they can rise (and fall) in

status with significant male figures such as their fathers or husbands. Both hereditary monarchies and sexual stratification are compatible with considerable social mobility.

Another issue that needs to be addressed is the possibility of other forms of social organization. Where earlier theorists like Durkheim tended to favour grand, unidimensional dichotomies, more recent theorists like Douglas (1973) have tended to favour two-dimensional classification schemes. However, as Ostrander (1982) argues, the two-dimensional models of social structure tend to collapse down to the grand dichotomies due to the instability of the alternate forms of social organization posited by the two-dimensional theories.

Douglas' (1973, 1982) group/grid model provides an illustrative example. Douglas proposes two orthogonal dimensions of social organization: group and grid. In high group societies, society is organized more around groups; whereas, in low group societies, society is organized more around individuals. In high grid societies, social life is highly regimented; whereas, in low grid societies, social roles and obligations are less rigidly defined. These two dimensions map out a quadrant of four different types of society: low group / low grid *individualism*, low group / high grid *atomized subordination*; high group / low grid *factionalism*, and high group / high grid *ascribed hierarchy*. Individualism and ascribed hierarchy correspond to what Brown (1988) calls open and closed class societies.

Shouldn't one also consider other forms of social organization, such as atomized subordination and factionalism? Not necessarily, for according to Ostrander (1982) atomized subordination and factionalism are both unstable forms of social organization. Consider factionalism, for example. In Douglas' scheme, factionalism is equivalent to Durkheim's mechanical solidarity but without the repressive laws. If Durkheim's analysis is correct, this would be an unstable arrangement as individuals (and groups) are not inherently interested in the maintenance of social order due to their lack of dependence on others. Therefore, without repressive laws (a high grid) to counteract individual and group interest, society will fray. It is only individualism and ascribed hierarchy that provide the societal stability in which cultural elites can arise and devote intellectual effort toward devising ideological defences for (and against) these forms of social organization. The Enlightenment project can be viewed as just such a battle between cultural elites with Enlightened individualism arrayed against the ascribed hierarchy of the Ancien Régime.

*A Revolution of the Mind*

One of the difficulties confronting psychological accounts of societal change is that there exists a body of scholarship that would appear to suggest that psychological concerns are secondary. This is perhaps most famously summarized by the classic Marxist dictum that "It is not the consciousness of men that determines their existence, but their social existence that determines their consciousness" (Marx, 1970, p. 21). In other words, it is social facts that determine the structure of people's minds, not the other way round.

However, it is important to note that on the central matter of social mobility, social facts would appear to be less important than culturally conditioned beliefs. In his cross-cultural analysis of historiographic practices, Brown (1988) was forced to rely more on accounts of the ideological support for social mobility than objective measures of real social mobility. Yet, he not only found that the predicted patterns held all the same, but that in the case of medieval China, ideological support for social mobility better accounted for historiographic practices than did actual social mobility. A related phenomenon has been observed by sociologists studying patterns of social mobility. The available evidence suggests that the United States does not differ appreciably from European countries in terms of their degree of social mobility (Erikson & Goldthorpe, 1992; Lipset & Bendix, 1959). Yet working class Americans are less likely than Europeans to support trade unions and more likely to support liberal economic policies when it might appear to be against their class interests to do so. Lipset and Bendix (1959) suggest that this is due to ideological differences between Americans and Europeans. Despite Americans being no more likely to rise in social status, they are more inclined to *believe* that changes in social status are possible and desirable and, therefore, they are more inclined to favour liberal economic policies that are viewed as promoting social mobility.

A related historical example, on which this paper will focus, is provided by Israel (2010). Israel has argued just the opposite of Marx with respect to the Enlightenment. He makes the case that not only was it a surge in radical Enlightenment philosophy that precipitated the French revolution, but that the intellectual precursors to French radical philosophy were not forged in the political economic cauldron of pre-revolutionary France. Instead, the radical Enlightenment had its origin in Holland a century earlier in the materialist, radically egalitarian philosophy of Spinoza. It is beyond the scope of this essay to mount a defence of Israel's thesis. I will simply take his proposal as a given and attempt to provide a cognitive exegesis of it. To the extent that Israel's history is bolstered by developments in modern cognitive science, its merit is further demonstrated.

Israel's specific proposal is that the European Enlightenment of the 18$^{th}$ century was neither a single pan-European intellectual movement, nor a collection of national movements (e.g., the French Enlightenment vs. the Scottish Enlightenment vs. the German Aufklarung). The Enlightenment was, instead, two pan-European intellectual movements: a radical Enlightenment that was secular, materialistic, and opposed to all forms of hereditary privilege; and a moderate Enlightenment that was less secular, less materialistic, and saw some room for hereditary privilege. Aligned on the radical side were Spinoza, Diderot, d'Holbach, Helvétius, Lessing, Paine, and Priestly. On the moderate side were Burke, Hume, Locke, Newton, Rousseau, Smith, and Voltaire. Moreover, it was the radical Enlightenment that drove the momentous cultural changes that transformed Europe in the Enlightenment and, though the radical Enlightenment suffered setbacks following the French revolution, it has ultimately triumphed with the spread of secular democracies in the latter half of the 20$^{th}$ century. It is the primarily the radical Enlightenment that this paper will focus on.

*Mental Modularity*

Any psychological account of Enlightenment thought would inevitably need to address the nature / nurture debate. The status of innate knowledge is central to two of the seminal documents of the Enlightenment, Locke's *An Essay Concerning Human Understanding* and *Two Treatises of Government*. In the *Essay*, Locke famously denies the existence of innate knowledge for if there is not any innate knowledge, then there can be no basis to the divine right of kings (the target of the *Two Treatises*) given the doctrine's presumption of an innate capacity to rule. Hence, it would seem that the current scientific status of the nature / nurture debate would be the obvious point of entry into a psychological exegesis of the Enlightenment. What is called for here is not empirical evidence but a rethinking of the issues, for contemporary thought in the cognitive sciences suggests that the nature / nurture debate is based on a false dichotomy. To see this we need only consider two caricatured positions on either side of the debate (Symons, 1987; Tooby & Cosmides, 1992).

Consider first B. F. Skinner, the radical behaviourist, as a standard bearer of the nurture side of the debate. For Skinner, all human behaviour can be accounted for in terms of learning: classical and operant conditioning. But suppose we were to ask of Skinner: What about the mechanisms underlying classical and operant conditioning? Are they themselves learnt or are they innate? Skinner has no choice but to concede that the mechanisms of classical and operant conditioning are themselves innate, for were he to deny this he would open up the possibility of an infinite regress as one could then inquire as to the innateness of the mechanisms by which one learnt classical and operant conditioning, and so on ad infinitum. Regardless, Skinner (1981) did indeed view operant and classical conditioning as the innate products of natural selection.

Next consider Noam Chomsky, the linguist, as a standard bearer of the nature side of the debate. For Chomsky, the capacity for language is part of our innate endowment. But suppose we were to ask Chomsky: What about the word 'trumpet'? Are children born knowing the meaning of this word? Clearly Chomsky would have to agree that this aspect of language is not innate as young children in Japan, for example, can grow up never knowing what the word 'trumpet' means. Indeed, Chomsky (1965) proposed a 'language acquisition device,' an innate *learning* mechanism for the acquisition of language.

To summarize, both Skinner and Chomsky believe that some things are learned and some things are innate. Both propose innate learning mechanisms. What then is the source of their disagreement? It is not whether we come equipped with innate psychological mechanisms, but how specialized those psychological mechanisms are. For Skinner, the innate mechanisms are few and domain-general. For Chomsky, they are many and domain-specific. Operant conditioning is hypothesized to underlie the acquisition of any evolutionarily novel behaviour, whereas the language acquisition device is specialized to the learning of language. All psychological theories are nativist. As Leibniz famously quipped:

“There is nothing in the intellect that was not first in the senses, except the intellect itself.” The question is how domain-specific the intellect is and a vast range of findings suggest that a large portion of the intellect is domain-specific (to be reviewed below).

None of this was lost on Chomsky. In his influential review of Skinner’s behaviourist account of language, Chomsky (1959, p. 27) readily acknowledged that:

> anyone who sets himself the problem of analyzing the causation of behavior will ... concern himself with the only data available, namely the record of inputs to the organism and the organism’s present response, and will try to describe the function specifying the response in terms of the history of inputs. This is nothing more than the definition of his problem.

In other words, the theorist will inevitably refer to the stimuli, past and present, that are presented to the organism and its responses. But Chomsky continues: “The differences that arise between those that affirm and those that deny the importance of the ‘specific contribution of the organism’ [i.e., the innate psychological mechanisms that process the stimuli and generate the responses] to learning and performance concern the *particular character and complexity* of this function” (p. 27, emphasis added). Unfortunately many have simply interpreted Chomsky as arguing that the particular character and complexity of the function is that it is mental and innate, but far more importantly as he would later clarify (e.g., Chomsky, 1965), the particular character of the function is that it is specific to language.

By the early 1980s sufficient evidence had accumulated to suggest that not only language, but also perceptual processes, appear to be specialized. This culminated in Fodor’s (1983) summation and formulation of the mental modularity hypothesis. Language, perception, and motor programs are, according to Fodor, the functions of a class of mental mechanisms that share several characteristic features. They are domain-specific, informationally encapsulated, cognitively impenetrable, mandatory, fast, produce shallow outputs, subserved by a dedicated neural architecture, and display a characteristic pattern of breakdown and an endogenously determined development. Domain-specificity means that the information processed by the mechanisms is constrained – they only apply to a restricted range of tasks or problems. Informational encapsulation means that not all of the relevant information is brought to bear in solving the problem. As an example of this, consider the following two lines (Carey, 2009):

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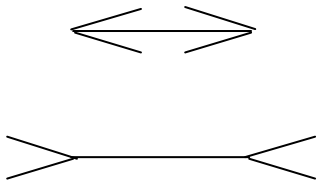
_____

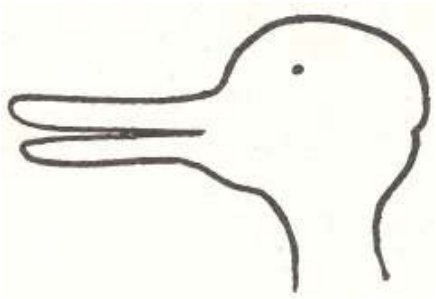
The lines are the same length. One knows that they are the same length, but if one adds fins to the lines to form the classic Müller-Lyer illusion:



the same line segment looks shorter in the top configuration than in the bottom configuration, despite the fact that one knows that they are the same length. In other words, your visual system is unable to make use of the information contained elsewhere in your mind that the two lines are identical in length.

Cognitive impenetrability indicates that we have little conscious awareness of the processes by which representations / knowledge are formed by the modules. All that we are aware of is their outputs. So, for example, native English speakers will generally be aware that the question: *Who do you want to visit?* is ambiguous in meaning. It could mean *Who do you want us to visit?* or *Who do you want to visit us?* By contrast, the sentence *Who do you wanna visit?* only supports one interpretation, the latter (Chomsky, 1980). Yet, most native English speakers are unable to account for why the *Want to* question has two potential meanings and the *Wanna* question only has one. We have little conscious awareness to the psychological processes that give rise to our linguistic judgments.

Modules are mandatory in that once their proprietary inputs are provided, the mechanisms are engaged. There is no override. One cannot wilfully decide to not see with one's eyes wide open. Because modules only process a restricted range of information, they are also relatively fast in producing their outputs, but by the same logic their outputs are not fully interpreted – there is still a range of information that can be brought to bear on their outputs in interpreting their meaning and significance. In other words, they produce shallow outputs. Consider the difference between *seeing* and *seeing as* illustrated by Wittgenstein's (1958, p. 194) famous duck-rabbit image:



Unless one is blind, one can't help but *see* the image, but whether one sees the image *as a duck* or *as a rabbit*, is a matter of interpretation that occurs after the visual system produces a shallow output that is merely seen.

Modules are also "hardwired" into our brains. Modular processes are the computed by dedicated neurological structures that are innate in the sense that they reliably develop in normal environments. Because they are associated with specific brain structures and their effects are restricted, when those brain structures are damaged, restricted and characteristic patterns of psychological and behavioural deficits result.

In contrast to modular language, perception, and motor programs, Fodor held that central thought processes are not modular. As a result, there is a blurring in Fodor's proposal between those features that characterize modules and those features that characterize input / output systems. This confusion is important because there are a significant number of cognitive scientists who disagree with Fodor and hold the view that many central thought processes are modular too (see Hirschfeld & Gelman, 1994). Hence, a chain of modules might feed into one another from the peripheral to the more central such that the outputs of more peripheral modules are the inputs of more central modules. If this is the case, then several of Fodor's proposed characteristics of modules become problematic. What would it mean, for example, not to have central access to a central mechanism? What would it mean for a central module to produce a shallow output if the the function of the module were to provide rich interpretation of the shallow outputs of more peripheral modules? How can one tell if a central module is fast, if the only means one has of triggering it is by presenting an external stimulus that must first be processed through a series of other modules? In the end, those cognitive scientists who are interested in more central modules tend to focus on domain-specificity; neural specificity, including characteristic patterns of breakdown; and endogenously determined development, including its corollary, cross-cultural universality (Hirschfeld & Gelman, 1994).

Modularity helps to make sense of many striking findings in the clinical neurosciences (Shallice, 1988). Clinical neuroscience is replete with various agnosias – specific knowledge or competence deficits – Fodor's characteristic patterns of breakdown. Consider, for example, prosopagnosia – the inability to recognize faces (Damasio, Tranel, Damasio, 1990). Persons with prosopagnosia display ordinary or near ordinary abilities to recognize everyday objects and animals, for example, while being severely impaired in recognizing people by their faces – even though they can recognize people by their voices, hair styles, gait, etc. For example, Edward, a participant with prosopagnosia in Duchaine et al.'s (2006) study was no different from neurologically normal individuals in his recognition of individual cars, guns, horses, houses, landscapes, sunglasses, and tools, but his performance on faces was roughly half that of the normal controls. Moreover, the average time it took him to make a judgment about the faces was more than four standard deviations longer than the average amount of time taken by the normal controls. Brain

imaging studies conducted on neurologically normal participants suggest that a region of the fusiform gyrus, hence dubbed the fusiform face area, is selectively activated when viewing faces (Kanwisher, McDermott, & Chun, 1997). This is roughly the same region of the brain that had previously been found to be damaged in a review of propospagnosia cases (Meadows, 1974).

In cognitive development, extensive research has been conducted into various 'core' domains of knowledge that are held to be modular (Carey, 2009). These include our intuitive understanding of objects, number, and agency. For example, studies of infants as young as 2.5 months old suggest that they 'know' that solid objects do not pass through one another (Spelke, Breinlinger, Macomber, & Jacobson, 1992). Given the lack of motor coordination in such young infants, it is highly unlikely that they acquired this knowledge from their environment. Instead, it would appear that this is 'hardwired'. One might argue that knowledge of object properties is part of visual, i.e., perceptual, processing and, therefore, not a central thought process. However, evidence from certain visual illusions suggests that we are capable of perceiving physically impossible events suggesting that the knowledge that these events are anomalous is post-perceptual (Leslie, 1988). Studies also suggest that children make different inferences about objects and living things (Keil, 1992). Our intuitive, domain-specific understanding of biological kinds, has also been the focus of considerable anthropological investigation (for examples, see Medin & Atran, 1999). I will discuss our intuitive understanding of inanimate objects and living things, so called folk-physics and folk-biology, later, so will not dwell on these abilities here.

*Proper, Actual, and Cultural Domains*

In parallel with developments in the cognitive sciences, biologists had developed a growing appreciation for role of improbable functional complexity in evolutionary theorizing. Although Darwin was quite aware that apparent design provided evidence of past history of selection, he also lived in a time when such natural design was also taken, even by scientists, as a sign of special creation. As a result, Darwin at times downplayed apparent design, as in his account of the facial expression of emotions (Fridlund, 1994), in order to demonstrate the merits of his approach over creationist accounts of natural design. By the second half of the 20$^{th}$ century, creationist accounts of design had lost all scientific credibility, so there was a renewed appreciation of the evolutionary significance of apparent design. The classic expression of this new found interest in design was Williams' (1966) *Adaptation and Natural Selection* in which he argued that what evolutionary biologists must demonstrate if they want to claim that a trait is an evolved adaptation is evidence of apparent special design.

By the late 1980s, Williams' arguments regarding adaptation and design were making serious inroads into human sociobiology, ultimately resulting in the emergence of evolutionary psychology (Symons, 1987; Tooby & Cosmides, 1992). What eventually emerged was a synthesis of adaptationist theorizing and modularity that has come to be

known as massive modularity hypothesis, with 'massive' referring not to the size of the modules, but their number (Samuels, 1998). Modules are, according to Cosmides and Tooby (1994), nothing more than evolved psychological adaptations. Their domain-specificity, informational encapsulation, neural specialization, and reliable development all suggest apparent special design for solving recurrent ancestral problems. According to Tooby and Cosmides (1992) both peripheral and central cognitive processes are modular, or more precisely adaptations.

A corollary of the massive modularity hypothesis is the assumption that modular adaptations have only evolved to solve recurrent ancestral problems and not necessarily the sorts of problems that routinely confront contemporary humans. The reason is that it takes many generations of directed selection for an adaptation to evolve and all the more so the more complex the structure. Given that modules are presumably complex structures, it would likely have taken many generations for them to evolve. The inputs that these modular adaptations were designed by natural selection to process constitute the *proper domain* of the mechanism (Sperber, 1994). However, once a mechanism exists, it can potentially be put to new uses, either accidentally or intentionally. Just as clothes hangers, designed to drape clothes on, can be used to unlock a car door, so too psychological adaptations designed to solve some ancestral problem, might be coopted to solve an evolutionarily new problem. The *proper function* of clothes hangers is to hang clothes, but if one is instead used to open a car door, then its *actual function* is (or includes) opening car doors (Millikan, 1984). Hence, the total range of inputs that can be processed by a module constitutes its *actual domain* (Sperber, 1994). Given the greatly expanded use of information by humans (Tooby & DeVore, 1987), Sperber argues that the actual domains of humans' modules are probably much bigger than their proper domains. If humans, in turn, actively or systematically structure the inputs of a module in order to produce certain effects, then one may speak of the *cultural domain* of the module.

As a practical matter, it is only useful to distinguish between proper, actual, and cultural domains of a mechanism if the mechanism itself is not radically transformed by the inputs it processes. If, beyond the fact that it is operating outside of its proper domain, a module's operations are radically transformed by processing nonproper inputs, then it makes little sense to speak of an enduring entity that has a proper domain of application. Hence, considered separate from their domain of application, modules possess characteristic modes of construal, manners in which information is represented and processed that "yield different forms of explanation that resonate with specific sets of phenomena" (Keil, 1994, p. 251). The question is whether a module's mode of construal is radically altered when it is applied to inputs outside of its proper domain of application. Given that modules are informationally encapsulated, i.e., that the classes of secondary information that a module draws upon are highly constrained, and that they are supported by dedicated neural systems, the possibility of radically different forms of processing would

appear to be constrained. Regardless, a couple lines of evidence suggest that characteristic modes of construal persist despite extensions to novel domains of information.

The first line of evidence is the widespread phenomena of metaphor and analogy (Lakoff, 1987). With metaphor and analogy, one's understanding of a base domain of knowledge is extended to a target domain. Consider, for example, a Neil Young lyric from the song of the same name, *Love is a rose*. In this example, one's knowledge of roses is the base domain and love is the target domain. Although it is conceivable that in the process of forming the metaphor, what one believed about roses is transformed – e.g., that one took roses to be a type of cheese instead of a thorny flower – this is not what happens and so it is perfectly meaningful when the song continues: *but you better not pick it / It only grows when it's on the vine. / A handful of thorns and / you'll know you've missed it*. Whereas had analogizing love to a rose transformed one's beliefs about roses into something related to cheese, the rest of the song would have been meaningless. Needless to say, this is not how metaphors or analogies work and it is not clear why modular modes of construal should be any different.

A second line of evidence concerns the neurological process by which modules are coopted for evolutionarily novel uses. There is a range of evidence suggesting that this phenomenon does, indeed, occur (Anderson, 2007a, 2007b; Dehaene & Cohen, 2007). For example, evolutionarily older parts of the brain – i.e. structures that have had a greater opportunity to be coopted – appear to be involved in a greater variety of tasks (Anderson, 2007a, 2007b). However, for present concerns, Dehaene and Cohen's (2007) review is more informative. They observe that evolutionarily novel tasks appear to coopt regions of the brain that originally possessed a proper function that isomorphic to the type of processing required by the newer task. Hence, the mode of construal that these regions of the brain support appears to be the same in both the ancestral (proper) functioning and in the coopted (actual) functioning of the brain region.

*Which Modular Modes of Construal Underlie Open and Closed Society?*

A key distinction between open and closed class societies is the existence of hereditarily ascribed social groupings. Hence, the psychological underpinnings of racialist thought will be central to any account of open and closed class society. Of considerable relevance here is Hirschfeld's (1996) proposal that humans possess a human kind module that underlies racialist thought. Others (Atran, 1990; Boyer, 1990; Gil-White, 2001) have suggested that racialist thought is part of the actual, but not proper, domain of a folk-biology module. Given that there are independent grounds for postulating the existence of a folk-biology module to account for our naive intuitions about the biological world (Atran, 1990, 1998; Medin & Atran, 1999, 2004), Hirschfeld's postulation of an additional human kinds module, generating many of the same patterns of inference as the folk-biology module, would appear to be nonparsimonious. Moreover, closed class societies are often

characterized by biological metaphors that go beyond human kinds. For example, it is common in closed class societies to model the whole society on an organic model.

Organic models of society also lend support to social stasis. As Popper (1966, p. 174) notes:

> in an open society, many members strive to rise socially, and to take the places of other members. This may lead, for example, to such an important social phenomenon as class struggle. We cannot find anything like class struggle in an organism. He cells or tissues of an organism, which are sometimes said to correspond to the members of a state, may perhaps compete for food; but there is no inherent tendency on the part of the legs to become the brain, or of other members of the body to become the belly. Since there is nothing in the organism to correspond to one of the most important characteristics of the open society, competition for status among its members, the so-called organic theory of the state is based on a false analogy. The closed society, on the other hand, does not know much of such tendencies. Its institutions, including its castes, are sacrosanct – taboo. The organic theory does not fit so badly here. It is therefore not surprising to find that most attempts to apply the organic theory to our society are veiled forms of propaganda for a return to tribalism.

Such organic models of society are routinely contrasted with mechanistic models of society (Mannheim, 1953). Indeed, Mannheim refers to the use of the concepts of organism and mechanism in this way as two different 'styles of thought', which resonates with the modes of construal that I have discussed here:

> By 'style of thought' I understand not only a set of concepts linked together by a coherent *Weltanschauung*, but also a specific approach to reality which tends to influence the method of thinking and the presentation of facts. Both concepts, mechanism and organism, originally emerged from the field of everyday thought [Mannheim, 1953, p. 165, emphasis original].

As with Popper, Mannheim aligns this style of thought with closed class societies ('conservatism'), both medieval and romantic political theory. By contrast, following the widespread consensus, he aligns mechanism with early modern science, the Enlightenment, the concept of the social contract. It is this mechanistic style of thought that was most avidly adopted by advocates of the radical Enlightenment, who were almost uniformly materialists and condemned for being such by their moderate critics (Israel, 2010).

We have, then, two styles of thought: organism aligned with conservative, closed societies and mechanism aligned with radical / liberal, open societies. Mannheim suggests that both styles of thought have their origins in the 'field of everyday thought'. Organism, I have suggested, is grounded in our intuitive understanding of biology, generated by an

evolved folk-biology module. Mechanism, I will suggest, is grounded in our intuitive understanding of rigid object mechanics, generated by a separate evolved module, what Leslie (1994) has called a Theory of Body mechanism (ToBy). In the remainder of this essay I will review the characteristics of these modules and the evidence for their separate existence. In so doing, it will hopefully become apparent why a folk-biological mode of construal lends support to closed class societies, whereas a ToBy mode of construal lends support to open class societies.

*Folk-biology*

Medin and Atran (2004; Atran, 1998) have proposed that humans possess a folk-biology module that governs our naive inferences about biological kinds. In other words, unless specifically educated otherwise, our default reasoning about biological kinds is guided by the folk-biology module. The folk-biology module gives rise to a mode of construal characterized by two main principles. The first is ranked taxonomy. "Biological ranks are second-order classes of groups (e.g., species, family, kingdom) whose elements are first-order groups (e.g. lion, feline, animal)" (Medin & Atran, 2004, p. 962). As the examples suggest, biological ranks are organized hierarchically, from subordinate generic species to up to more inclusive superordinate rankings such as general lifeforms, e.g. plants versus animals. A wide variety of evidence suggests that these ranked taxonomies are universally observed cross-culturally (Medin & Atran, 1999, 2004; Atran, 1990, 1998).

More important for present concerns is the principle of biological essentialism. This multifaceted principle holds that "each species has an underlying causal nature, or internal essence, that is uniquely responsible for the typical appearance, behavior, and ecological preferences of the kind" (Medin & Atran, 2004, p. 962). Again, this is supported by a wide body of evidence, both developmental (Gelman, 2003; Keil, 1992, 1994; Medin & Atran, 2004) and cross-cultural (Atran, 1990, 1998; Medin & Atran, 1999). Of particular importance for present concerns is the observation that people, including young children, assume that biological essences are inherited and they resist the idea that biological kinds can change their essence (e.g., Keil, 1992). For example, Keil (1992, p. 162) conducted a study with children in which they were asked to consider the following scenario:

> These are animals that live on a farm [the children were also shown a picture of horses]. They go "neigh" and people put saddles on their backs and ride them, and these animals like to eat oats and hay and everyone calls them horses. But some scientists went up to this farm and decided to study them really carefully. They did blood tests and X-rays and looked way deep inside with microscopes and found out that these animals weren't like most horses. These animals had the inside parts of cows. They had the blood of cows, the bones of cows; and when they looked to see where they came from, they found out that their parents were cows. And, when they had babies, their babies were cows. What do you think these animals really are: horses or cows?

By contrast, the children were also read a parallel description of a nonbiological kind, such as this:

> There are these things that look just like this (shows key picture). People use these things to open up locked doors, and also to lock up cars and houses to keep them safe. Some scientists just studied a special group of these things that came from a factory in Pennsylvania where they are made for opening locks. They looked at them very closely with a microscope to see what they were like way down inside and to see what they were made out of. They found out that they weren't like most keys; they were made out of the same stuff that pennies are made out of. In fact, when they looked to see where these things came from, they found out that pennies had been melted down in order to make these things; and when they were all done, they melted them down again and made pennies again. What do you think these things are: keys or pennies?

At all ages studied (kindergarteners, grade 2, and grade 4), the children were more swayed by the descriptions of the living things (e.g., horse-cow) than the nonliving things (e.g., key-penny). In other words, the children were more likely to say that the horse with the cow insides was a cow, not a horse, whereas they thought the key was a key, regardless of how it was described in the story. However, the differences between the living and nonliving examples increased with age.

> Here is how one second grader responded to the questioning (Keil, 1992, p. 170):
>
> E: Cow or horse?
>
> C: What about just under the skin?
>
> E: They had all the insides of cows (repeats description). What are they?
>
> C: Cows... well, it doesn't really matter what they are outside... do they act like cows?
>
> E: I know that people ride them, and they make a sound of a horse, but when the scientists studied their insides, and their babies (repeats description), they said cows.
>
> C: I think they're cows, but how could they look like horses if their parents are cows?
>
> E: I don't know... If it's a cow, how could it wind up looking just like a horse?
>
> C: Maybe someone skinned the cow and put a horse skin on it instead.
>
> E: But if this were a real animal, ...
>
> C: Well, I still think it's a cow.

Whereas when asked about the key-pennies a kindergartener replied (p. 172):

C: Keys.

E: Why?

C: Because it is not circled.

E: What else?

C: Because it's got one of these, a straight line (pointing to the length of the key).

E: Even though it's made of the same insides as pennies, it's still a key?

C: Yes.

Hence, when asked about the nonliving keys, the children were more influenced by the appearance of the thing in question. The "insides" and origins of the artefacts didn't influence their judgments about what sort of thing they were.

In another study, Keil (1992) read children descriptions in which a non/living thing was transformed. For example, one of the biological transformation stories read as follows (p. 184):

> The doctors took a raccoon (show picture of raccoon) and shaved away some of its fur. They dyed what was left all black. Then they bleached a single stripe all white down the center of its back. Then, with surgery (explained to the child in preamble), they put in its body a sac of super smelly odor, just like a skunk has... When they were all done, the animal looked like this (show picture of skunk). After the operation was this a skunk or a raccoon?

Again, there were also nonliving stories. One of the nonliving stories read as follows (p. 184):

> The doctors took a coffeepot that looked like this (show picture of coffeepot). They sawed off the handle, sealed the top, took off the knob, sealed closed the spout, and sawed it off. They also sawed off the base and attached a flat piece of metal. They attached a little stick, cut a window in it, and filled the metal container with birdfood. When it was done, it looked like this (show picture of birdfeeder). After the operation was this a coffeepot or a birdfeeder?

Keil observed that children at all ages tested (kindergartener, grade 2, grade 4) were more likely to resist the change of kind type for the biological kind than the artefact.

Here is how a second grader responded to questioning (p. 189):

C: Raccoon... just because they made it look like a skunk, it's not really one.

E: Why is it still a raccoon? It looks just like a skunk...

C: It just looks like a skunk and it has its smell.

E: But it's still a raccoon?

C: Yes.

E: Why could you change a pipe into a flute [refers to a different nonliving scenario], but you couldn't change a raccoon into a skunk?

C: One's alive and one's not.

Conversely, when responding to the coffeepot-birdfeeder story, one of the kindergarteners replied (p. 192):

C: I think they made it into a birdfeeder because it doesn't have a spout, and coffeepots need spouts and it doesn't have a handle... and how are you supposed to hold onto it if it doesn't have a handle?

E: Can it be a birdfeeder even though it came from a coffeepot?

C: Yes.

Hence, for biological things, children are very resistant to the idea that it might change its kind. For nonliving things, children are much more willing to grant that they can change their kind.

Atran (1990), Boyer (1990), and Gil-White (2001) have suggested that the folk-biological module thought to underlie the pattern of inferences displayed by these children, also underlies people's thoughts about races. Hence, Gil-White (2001) performed a comparable series of studies in Mongolia with ethnic Torguuds (Mongols and Kazakhs are other ethnic groups found in Mongolia). He asked them the following:

A Kazakh couple has a child that they don't want. They give it in adoption to a Mongol couple when the child is under a year old. Around the Mongol family there are only Mongols, and the child grows up *never meeting or seeing a single Kazakh*. He is never told of the adoption *and thinks that his biological mother and father are the Mongol adopters*. He grows up learning Mongol customs and language. What is the ethnicity of *this* child? [p. 522, emphasis original].

The study was conducted over two years with two different samples of participants. In the first year, 59% of participants said that the child would be a Kazakh, not a Mongol. In the second year, 76% of participants said that the child would be a Kazakh. Hence, adult participants also display a resistance to people changing their ethnic status leading Gil-White to conclude that his Torguud participants had coopted their folkbiology module when thinking about ethnic groups.

If we accept Gil-White's argument, then it immediately suggests why biological metaphors are routinely invoked in closed class societies. If, when adopting a folk-biological mode of construal one tends to think of an entity's status being fixed at birth and resistant to any change, then this naturally supports closed social statuses. They are ascribed at birth and cannot subsequently be changed. If, on the other hand, society permits people to change their social status, then social status needs to be conceptualized differently. The results of the artefact conditions in Keil's experiments suggest what this alternate conceptualization might be – viewing people like material artefacts, i.e., adopting Mannheim's mechanism style of thought.

*Theory of Body module*

As alluded to earlier, even very young infants appear to understand that solid objects cannot pass through one another (Spelke et al. 1992). Studies such as this (reviewed in Carey, 2009), have prompted Leslie (1994) to propose that humans possess a Theory of Body module, ToBy, with physical objects as its proper domain. Leslie suggests that the function of ToBy is "to arrive at a description of the world in terms of the mechanical constitution of physical bodies and the events they enter into" (p. 125). Mithen (1996) suggests that this module (also widely called *folk-physics*) our competence for making tools – i.e., for making the nonliving artefact transformations described in Keil's (1992) studies. One of the properties of tools is that they are for practical ends and serve to improve or enhance our functioning. Hence, one might predict that if people or society, more generally, are viewed via ToBy's mode of construal, one would tend to seek practical outcomes – i.e., one might be predisposed to progressive, reformist agendas. As a result, materialism and progressivism go hand in hand. Moreover, as Keil's (1992) studies suggest, ToBy can tolerate radical transformations.

Israel (2010) routinely notes that advocates of the radical Enlightenment are materialists and radical progressives. However, these are largely treated by Israel (and others) as coincidental features of radical thought. The analysis provided here suggests that there is, in fact, a deep connection between materialism, progress, and social mobility. In climbing the social ladder, one changes one's social status. Such changes are barred by a folk-biological mode of construal, but permitted and even encouraged by a ToBy (tool-making) mode of construal.

In arguing that a folk-biological mode of construal underlies closed class societies and a ToBy mode of construal underlies open class societies, one is not thereby committing oneself to the corollary that people consciously view persons as biological kinds with essences or inanimate physical objects, respectively. Modules operate outside on one's conscious awareness. There is, therefore, no reason to believe that the persons engaged in these styles of thought will have self-reflective knowledge of their own reasoning patterns. At best, one might have a sense of what seems to work, what feels right, and what does not. Just as one has a feeling for what utterances in one's native language seem to work or feel

right, without thereby also being fully cognizant of the cognitive processes that determine such judgments. Nor, should one expect, as Mannheim (1953) cautions, that any one person should fully and consistently exhibit a particular style of thought, i.e. mode of construal. However, for Mannheim, such caution is merely expedient, but from a modular perspective on can give a more reasoned defence of such caution.

When operating outside of the proper domain of a module, the evolutionary history of the module provides no guarantee either that the module's mode of construal will coherently mesh with its actual domain of application or that the person engage in such nonproper applications will be flawless in their execution. Their access to the relevant workings of their own mind is limited and considerable intellectual effort will likely be required in order to make the mode of construal match its inputs. The further one strays from the proper domain of the mechanism, the more contrived its application will seem; whereas, the closer one is to theorizing about the proper domain of the module, the more intuitive the results will appear. Hence, it is not surprising that folk-biological Aristotelian metaphysics should have been overturned first in physics and only centuries later in biology. So too both folk-biology and ToBy might seem unsatisfactory when applied to humans and their societies. It will take years of intellectual effort to recast human nature and society in implicit biological or physical terms, establishing cultural domains for the mechanisms.

## Conclusion

Human societies vary in their degree of openness, though two forms of social organization appear to predominate – at least in terms of their cultural richness: individualistic societies and ascribed hierarchies. These societies vary along two dimensions: the importance that they assign to groups and the rigidness with which they regulate their members behaviour. If one interprets social regulation as constraints placed on social mobility – i.e., changes of status – then a modular analysis of social ideology potentially suggests why these two dimensions of social organization (group and grid) do not independently vary and why individualism and ascribed hierarchy appear to be particularly stable forms of social organisation. Individualism and ascribed hierarchy are made intuitively appealing by virtue of being underwritten by two distinct psychological modules, ToBy and folk-biology, respectively. That high group and high grid should stably co-occur is suggested by the folk-biological underpinning of ascribed hierarchy. The proper domain of folk-biology is biological kinds, as opposed to aggregates, and essentialism is a key principle of its mode of construal. Ascribed hierarchy, therefore, is high group due to the focus on kinds and high grid due to the constraints on status changes imposed by biological essentialism. Through similar lines of reasoning other features of open and closed class societies might be account for by reference to these coopted modules, but this will have to be postponed to future analyses.

References


Anderson, M. (2007a). Evolution of cognitive function via redeployment of brain areas. *The Neuroscientist*, *13*, 1-9.

Anderson, M. (2007b). Massive redeployment, exaptation, and the functional integration of cognitive operations. *Synthese*, *159*, 329-345.

Atran, S. (1990). *Cognitive foundations of natural history*. New York, NY: Cambridge University Press.

Atran, S. (1998). Folk biology and the anthropology of science: Cognitive universals and cultural particulars. *Behavioral and Brain Sciences*, *21*, 547-609.

Boyer, P. (1990). *Tradition as truth and communication: A cognitive description of traditional discourse*. Cambridge: Cambridge University Press.

Brown, D. (1988). *Hierarchy, history, and human nature: The social origins of historical consciousness*. Tucson, AZ: University of Arizona Press.

Carey, S. (2009). *The origin of concepts*. New York, NY: Oxford University Press.

Chomsky, N. (1959). Review of Skinner's *Verbal Behavior*. *Language*, *35*, 26-58.

Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.

Chomsky, N. (1980). *Rules and representations*. Oxford: Blackwell.

Cosmides, L. & Tooby, J. (1994). Origins of domain specificity: The evolution of functional organization. In L. Hirschfeld & S. Gelman (Eds.). *Mapping the mind: Domain specificity in cognition and culture* (pp. 85 – 116). New York, NY: Cambridge University Press.

Damasio, A.R., Tranel, D., & Damasio, H. (1990). Face agnosia and the neural substrates of memory. *Annual Review of Neuroscience*, *13*, 89-109.

Dehaene, S. & Cohen, L. (2007). Cultural recycling of cortical maps. *Neuron*, *56*, 384 – 398.

Douglas, M. (1973). *Natural symbols*. London: Penguin.

Douglas, M. (1982). Introduction to grid/group analysis. In M. Douglas (Ed.). *Essays in the sociology of perception* (pp. 1 – 8). London: Routledge & Kegan Paul.

Duchaine, B., Yovel, G., Butterworth, E., & Nakayama, K. (2006). Prosopagnosia as an impairment to face-specific mechanisms: Elimination of the alternative hypotheses in a developmental case. *Cognitive Neuropsychology*, *23*, 714 – 747.

Durkheim, E. (1933). *The division of labor in society*. New York, NY: Free Press.

Erikson, R., & Goldthorpe, J. (1992). *The constant flux: A study of class mobility in industrial societies*. Oxford: Clarendon Press.

Fodor, J. (1983). *The modularity of mind*. Cambridge, MA: Bradford.

Fridlund, A. (1994). *Human facial expression: An evolutionary view*. San Diego, CA: Academic Press.

Gil-White, F. (2001). Are ethnic groups biological "species" to the human brain? Essentialism in our cognition of some social categories. *Current Anthropology*, *42*, 515-536.

Hirschfeld, L. (1996). *Race in the making: Cognition, culture, and the child's construction of human kinds*. Cambridge, MA: Bradford.

Hirschfeld, L. & Gelman, S. (1994). *Mapping the mind: Domain specificity in cognition and culture*. New York, NY: Cambridge University Press.

Israel, J. (2010). *A revolution of the mind: Radical enlightenment and the intellectual origins of modern democracy*. Princeton, NJ: Princeton University Press.

Kanwisher, N., McDermott, J., & Chun, M.M. (1997). The fusiform face area: A module in human extrastriate cortex specialized for face perception. *Journal of Neuroscience*, *17*, 4302-4311.

Keil, F. (1989). *Concepts, kinds, and cognitive development*. Cambridge, MA: Bradford.

Keil, F. (1994). The birth and nurturance of concepts by domains: The origins of concepts of living things. In L. Hirschfeld & S. Gelman (Eds.). *Mapping the mind: Domain specificity in cognition and culture* (pp. 234 – 254). New York, NY: Cambridge University Press.

Lakoff, G. (1987). *Women, fire, and dangerous things*. Chicago, IL: University of Chicago Press.

Leslie, A. (1988). The necessity of illusion: perception and thought in infancy. In L. Weiskrantz (Ed.), *Thought without language* (pp. 185 – 210). Oxford: Oxford Science Publications.

Leslie, A. (1994). ToMM, ToBy, and agency: Core architecture and domain-specificty. In L. Hirschfeld & S. Gelman (Eds.). *Mapping the mind: Domain specificity in cognition and culture* (pp. 119-148). New York, NY: Cambridge University Press.

Linton, R. (1936). *The study of man: An introduction*. New York, NY: Appleton Century Crofts.

Lipset, S. M. & Bendix, R. (1959). *Social mobility in industrial society*. Berkeley, CA: University of California Press.

Maine, H. S. (1931). *Ancient law*. London: Oxford University Press.

Mannheim, K. (1953). *Essays on sociology and social psychology*. London: Routledge & Kegan Paul.

Marx, K. (1970). *A contribution to the critique of political economy / With an introduction by Maurice Dobb*. New York, NY: International Publishers.

Meadows, J.C. (1974). The anatomical basis of prosopagnosia. *Journal of Neurology, Neurosurgery, and Psychiatry*, *37*, 489-501.

Medin, D. & Atran, S. (1999). *Folkbiology*. Cambridge, MA: Bradford.

Medin, D. & Atran, S. (2004). The native mind: Biological categorization and reasoning in development and across cultures. *Psychological Review*, *111*, 960-983.

Mithen, S. (1996). *The prehistory of the mind: A search for the origins of art, religion and science*. London: Thames and Hudson.

Millikan, R. (1984). *Language, thought, and other biological categories*. Cambridge, MA: MIT Press.

Ostrander, D. (1982). One- and two-dimensional models of the distribution of beliefs. In M. Douglas (Ed.). *Essays in the sociology of perception* (pp. 14 – 30). London: Routledge & Kegan Paul.

Popper, K. (1966). *The open society and its enemies. Volume 1: Plato. (5th Ed.).* London: Routledge & Kegan Paul.

Samuels, R. (1998). Evolutionary psychology and the massive modularity hypothesis. *British Journal for the Philosophy of Science*, *49*, 575-602.

Shallice, T. (1988). *From neuropsychology to mental structure*. New York, NY: Cambridge University Press.

Skinner, B.F. (1981). Selection by consequences. *Science*, *213*, 501-504.

Spelke, E., Breinlinger, K., Macomber, J., & Jacobson, K. (1992). Origins of knowledge. *Psychological Review*, *99*, 605-632.

Sperber, D. (1994). The modularity of thought and the epidemiology of representations. In L. Hirschfeld & S. Gelman (Eds.). *Mapping the mind: Domain specificity in cognition and culture* (pp. 39 – 67). New York, NY: Cambridge University Press.

Symons, D. (1987). If we're all Darwinians, what's the fuss about? In C. Crawford, M. Smith, & D. Krebs (Eds.). *Sociobiology and psychology: Ideas, issues and applications* (pp. 121 – 146). Hillsdale, NJ: Lawrence Erlbaum.

Tooby, J. & Cosmides, L. (1992). The psychological foundations of culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.). *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 19 – 136). New York, NY: Oxford University Press.

Tooby J. & DeVore, I. (1987). The reconstruction of hominid behavioral evolution through strategic modeling. In W. Kinzey (Ed.), *Primate models of hominid behavior* (pp. 183-237). New York: SUNY Press.

Weber, M. (1976). *The protestant ethic and the spirit of capitalism (2nd Ed.)*. London: Allen & Unwin.

Williams, G.C. (1966). *Adaptation and natural selection*. Princeton, NJ: Princeton University Press.

Wittgenstein, L. (1958). *Philosophical investigations (3rd Ed.)*. Englewood Cliffs, NJ: Prentice Hall.