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Deontic Reasoning, Modules and Innateness: A Second Look

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Abstract: Cummins (this issue) puts the case for an innate module for deontic reasoning. We argue that this case is not persuasive. First, we claim that Cummins' evolutionary arguments are neutral regarding whether deontic reasoning is learned or innate. Second, we argue that task differences between deontic and indicative reasoning explain many of the phenomena that Cummins takes as evidence for a deontic module. Third, we argue against the suggestion that deontic reasoning is superior to indicative reasoning, either in adults or children. Finally, we re-evaluate Cummins' interpretation of differences in children's performance on deontic and indicative versions of Wason's selection task.

1. *Introduction*

Indicative statements make claims about the way the world *is*. By contrast, deontic statements concern how things *ought* to be. In philosophy, the distinction between 'ought' and 'is' has often been taken to mark a fundamental divide between two realms of 'fact' and 'value'.[1] Could the deontic/indicative split also mark a fundamental *psychological* distinction? Cummins (this issue) argues that it does, and that, specifically, there is an innate 'domain-specific deontic reasoning module' (p. 166; all page references to Cummins, this issue, unless otherwise stated). This module is hypothesized to contain information about how to reason about permissions, obligations and other deontic statements.

Cummins marshals a wide range of considerations in support of this view. The structure of Cummins' argument is complex, so we attempt a brief summary here. Essentially, the argument has two aspects: an evolutionary motiv-

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[1] Although see, e.g., Putnam, 1981.

ation for a deontic module; and a discussion of empirical findings that this module purportedly explains.

First, then, the evolutionary argument. Cummins argues that 'the most pressing adaptive problems primates ... faced during their evolution were ... within species social co-ordination and social interaction, producing enormous pressure to develop strategies to solve these problems' (p. 166). Specifically, she argues that this required the ability to 'reason effectively about deontic concepts' (p. 166). This evolutionary argument is held to suggest strongly that there is a module for deontic reasoning. The principal support for this evolutionary argument comes from considerations of social behaviour in primates.

Second, Cummins argues that this module explains a range of findings 'including (a) why people access different strategies when reasoning about deontic and indicative situations, (b) why violation detection [this term is explained below] is the preferred strategy in deontic tasks, (c) why that preference emerges early in development, and (d) why it is observed regardless of very substantial cultural differences among reasoners' (p. 166), as well as being consistent with neuropsychological data concerning apparent disorders of social reasoning.

In this article, we argue that these considerations are not persuasive. Our argument divides into four sections. First, we argue against Cummins' evolutionary argument. Second, we argue that task differences between deontic and indicative reasoning problems are enough to explain many of the phenomena Cummins cites as evidence for a deontic module. Third, we challenge the view that deontic reasoning is superior to indicative reasoning, in either children or adults, thus undermining the suggestion that such superiority provides evidence for a domain specific module for deontic reasoning. Fourth, we reconsider Cummins' evidence from Wason's (1966, 1968) selection task.

2. *Evolution and Learning*

Cummins provides a number of arguments which suggest deontic reasoning occurs across cultures, across age groups and even across species. If, as Cummins suggests, social interactions are typically mediated by deontic rules, then the fundamental importance of social interactions in mind and behaviour suggests a fundamental role for reasoning about these rules.

But the mere prevalence, and importance, of deontic reasoning offers no obvious argument for its innateness. A vast range of knowledge and abilities are important in development, such as information about object permanence, the structure of space, natural language, perceptual and motor capacities, and so on. Indeed, these seem at least as fundamental to development as the aspect of human social behaviour concerned with deontic rules. Some theorists would argue that all these capacities are underwritten by innate information (perhaps even innate 'modules') (e.g. Fodor, 1983; Shallice, 1988). Others (e.g. behaviourists) would argue that none are underwritten by innate

modules; and intermediate positions of many kinds are of course possible. But merely to note the importance and prevalence of some knowledge or ability does not, in itself, offer evidence that it is innate, rather than learned.

For these reasons, claims concerning selectional pressure are also not convincing. It seems entirely likely that social reasoning poses problems that are of enormous importance from the point of view of natural selection. But it is clear that people can *solve* these problems. The question at issue is: to what degree are problems of social reasoning (and reasoning with deontic rules in particular) solved by innate structures and to what extent are they solved by learning? Let us use the two most extreme views for illustration. Suppose that social reasoning is underwritten by an innate module, as Cummins assumes; then it seems entirely plausible that evolutionary pressures will increase the adaptiveness of this module, just as for other innately specified structures, such as the hands or the lungs. Suppose, by contrast, that social reasoning is underwritten by learning. Then, evolutionary pressures will not act on an innate module, because there will be no innate module to act upon. Instead, these pressures might, for example, act upon the learning mechanism itself, to improve learning either in general, or learning about specifically social reasoning. The point is this: Cummins' evolutionary considerations provide no *argument* that innate modules must have been produced by evolutionary pressures. Evolutionary pressures are pressures to solve problems *somehow*: they do not specify whether a problem is solved by innate modules, by learning, or by any combination of the two.

It is, of course, possible that the problems of social reasoning faced by humans, and perhaps other primates, are too complex to be learned, and therefore that they must be the products of some innate endowment. This line of argument is frequently advocated in the case of language, which is typically viewed as too difficult to learn without strong innate constraints, given the poverty of the linguistic input available to the child, the complexity and nature of the grammar to be learned, the rapidity with which language is acquired, and so on (e.g. Chomsky, 1965, 1980; Pinker, 1984, 1994). It is not clear whether we have enough knowledge of human learning abilities or a deep enough understanding of what is involved in learning about social interactions to provide such an argument in this context. In the absence of such an additional argument, simply noting the selectional advantage conferred by the ability to solve social reasoning problems does not, by itself, provide evidence that social reasoning in general, or deontic reasoning in particular, is innate.

Finally, note that even if an innate module for *social reasoning* were established, this would not imply a fundamental cognitive split, such as Cummins suggests, between indicative and deontic reasoning. Social reasoning requires reasoning about both deontic and indicative information. For an agent to know if it is about to break some deontic rule (e.g. that killing others is wrong), it has to know the rule; but it also has to be able to reason about the consequences of its actions (e.g. that putting poison in the food might result in death). Furthermore, effective social reasoning requires deciding which other agents will detect the violation, how they will react to it, and so on. In short, it requires reasoning about facts, as well as about deontic rules. An analogy with law may be helpful. The law consists of a complex array of deontic rules, which specify limits on how people *should* behave; but legal reasoning requires relating these rules to what *actually happened*. And establishing what actually happened is the domain of indicative reasoning. Applying deontic rules, and reasoning about social situations in general, requires reasoning about a mixture of deontic and indicative matters. So ability at (and cognitive mechanisms for) social reasoning appear to require ability at (and cognitive mechanisms for) *both* deontic and indicative reasoning, rather than driving a wedge between the two.

In this section, we have argued that the evolutionary considerations, which Cummins views as central to her thesis, do not bear on whether there is an innate module for deontic reasoning. We now turn to the phenomena that Cummins claims the proposed deontic reasoning module explains.

3. *Deontic versus Indicative Reasoning*

We have already noted that philosophers have pointed to a deep divide between deontic and indicative statements. Moreover, from the point of view of common sense, it seems reasonable that we should treat the two in very different ways. For example, indicative rules, such as that all fish swim, make claims about how things are. These claims can be confirmed or disconfirmed by enquiry into the world (specifically, concerning the swimming abilities of various fish). But it makes no sense to speak of obeying or disobeying an indicative rule. By contrast, a deontic rule, such as that people under 18 should not drink, can be obeyed or disobeyed; but it cannot be confirmed or disconfirmed by enquiry into the world. However many people under 18 drink, the deontic rule that they should not drink remains in force.[2] Although it makes no sense to attempt to confirm or disconfirm a deontic rule, it does, by contrast, make sense to attempt to *enforce* it: to identify violators of the rule—such as underage drinkers.

Given the profound difference between the two, it seems unavoidable that people will reason differently with deontic and indicative rules. This deals with the first of Cummins' four points, which she argues are explained by a deontic reasoning module: that 'people access different strategies when reasoning about deontic and indicative situations'. This difference is inevitable from the nature of the deontic/indicative distinction, and is neutral regarding whether deontic reasoning is subserved by an innate module.

[2] There are, of course, a range of philosophical viewpoints that do not see indicative and deontic statements as inhabiting entirely independent realms. For example, to the extent that current practices define moral norms (as might be argued by a cultural relativist), or to the extent that norms, such as aesthetic preferences, might be involved in deciding between scientific theories (e.g. Putnam, 1981), then deontic and indicative statements are not completely independent. But these rather rarefied connections do not affect the common sense distinction that is relevant here.

Moreover, it deals with Cummins' second point, that 'violation detection is the preferred strategy in deontic tasks'. Again, this follows directly from the fact that violation detection is a natural way to apply a deontic rule, whether or not the application of such rules involves an innate module.

Furthermore, the fundamental character of the deontic–indicative distinction appears sufficient to explain the apparent robustness of these reasoning differences across different cultures, which is Cummins' fourth point.

Cummins' remaining point is the early emergence of deontic reasoning in development. To some extent, this early emergence is to be expected. Because social relationships are, as Cummins strongly argues, fundamental to human activity, it is not surprising that they are an important priority in development. This priority could be met by an innate module. But it could equally result from a general purpose learning system focusing on the pressing problems of social reasoning. This could occur without the learning system having any prior category of social, or deontic reasoning. Because the infant's ability to satisfy its needs is so dependent on its social interactions with caregivers, even a simple reinforcement learning mechanism, which it learns so as to maximize its rewards, might be expected to develop an early focus on interacting with caregivers, and thereby with social reasoning. We do not want to argue that this non-nativist story concerning social reasoning is correct; merely that early emphasis on social, and in particular deontic, reasoning, does not provide evidence for an innate module for social reasoning.

We have shown that none of the four points that Cummins views as evidence for an innate deontic reasoning module is compelling. There is, however, a further point that Cummins takes as potential evidence for her position: neuropsychological evidence for a specific cognitive mechanism for social reasoning. She cites Damasio's (1994) arguments from human patients and animal studies that some forms of brain damage lead to specific impairments of social reasoning: i.e. a single dissociation of social reasoning from general cognition. Such single dissociations are notoriously weak evidence for underlying modularity of the cognitive system, because there are numerous ways in which a non-modular system can give rise to single dissociations. For example, social reasoning may be particularly complex, and therefore particularly impaired in response to some general system damage. The argument for a social reasoning module would be strengthened by finding the reverse dissociation: patients with normal social reasoning, but impaired non-social reasoning, thus providing a double dissociation between social and non-social reasoning. To our knowledge such patients have not been found.[3] So the neuropsychological evidence for a "module" for social

[3] Even a double dissociation between two tasks is not watertight evidence for separate modules underlying the two tasks (see Shallice, 1988, for a sophisticated discussion). On the other hand, certain *single* dissociations can be very difficult to explain by a non-modular system. For example, phonological dyslexia (Funnell, 1983), a reading disorder in which irregular words are spared, but the ability to pronounce non-words is lost, is not easy to explain in terms of single route models of reading (Bullinaria and Chater, 1995; Coltheart, 1985).

reasoning is quite weak; and the evidence for the additional step that this module is specific to *deontic* reasoning is weaker still.

4. *Is Deontic Reasoning Superior to Indicative Reasoning?*

Cummins might respond that capabilities at deontic reasoning are not merely good; but that they are *superior* to standard indicative reasoning abilities, about facts rather than norms. As we have already noted, this does not necessarily argue for an innate module for deontic reasoning; the central importance of social interactions for the young child might equally result from learning being initially focused on this kind of reasoning. Nonetheless, levels of deontic reasoning that are superior to indicative reasoning, in both adult and child, may be thought suggestive of some special innate component.[4]

Cummins sometimes appears to argue that deontic reasoning is superior to indicative reasoning. For example, she cites studies (e.g. Scribner, 1975) that appear to show that indicative reasoning is poor in preliterate cultures. This is contrasted with the deontic reasoning in such cultures (Harkness, Pope Edwards and Super, 1981), which appears to be highly fluent. Similarly, the deontic–indicative split appears to be assimilated with a split between social and scientific reasoning, with Cummins arguing that, from an evolutionary perspective 'Mammals seem to have . . . evolv[ed] cognitive architectures that enable them to be good social reasoners. In contrast, there was no corresponding pressure to be a good scientific reasoner' (p. 166). The implication Cummins draws appears to be that deontic reasoning should be better than indicative reasoning in mammals in general, and humans, in particular. Finally, in the context of the selection task, Cummins suggests that performance is superior in deontic rather than indicative versions of the task.

We argue that none of these considerations is compelling, for a number of reasons. First, note that Cummins' arguments that preliterate cultures and evolutionary pressures are biased towards social reasoning does not imply any bias towards deontic reasoning. This is because social reasoning requires applying *both* deontic and indicative reasoning, as noted above. Second, contemporary cognitive anthropologists typically assume that preliterate cultures have extremely elaborate abilities to reason about the external world (Cole, 1975), not merely about social conventions. Highly complex abilities, such as construction, animal tracking and navigation (e.g. Oatley, 1977) testify to high levels of indicative reasoning. Moreover, it has been persuasively argued that many apparently fallacious patterns of reasoning from preliterate cultures are actually common to literate societies (e.g. Shweder, 1977). Third, the contrast between evolutionary pressures for social and scientific reasoning is not appropriate. Evolutionary pressure bears upon the agent's ability to interact successfully with other agents or the external world. It does not bear upon the agent's ability to produce explicit theories concerning the nature of social and natural phenomena. In the domain of explicit theorizing, social phenomena have proved, if anything, more intractable than the phenomena studied by natural science. Both deontic and indicative aspects of social interactions have proved extremely difficult to codify (e.g. ethical systems, and to some degree legal systems, can be viewed as attempts to provide explicit deontic theories; and aspects of psychology and the social sciences can be viewed as attempts to provide theories of social interactions in indicative terms). In sum, the contrast between ability at social reasoning and other reasoning is therefore not as clear-cut as Cummins suggests. People (and, for that matter, infants) are able to interact in a complex and fluent way with both the social and the physical environments; and our ability to theorize about either domain is very limited.

Finally, it is not clear what standard might be used to compare deontic and non-deontic reasoning abilities. Prima facie, at least, this appears to be a matter of comparing apples and oranges. Moreover, deontic reasoning is potentially enormously rich and varied, as philosophical and anthropological work on ethical systems has made abundantly clear. And the development of adult competence concerning how to reason about deontic rules—which is fundamentally linked to the adult's social and ethical views—is clearly a long and complex process, as the literature on moral development attests (e.g. Piaget, 1932; Kohlberg and Gilligan, 1971). Indicative reasoning, about facts rather than norms, is perhaps even more multifarious—and it is entirely possible that reasoning in different (indicative) domains may be very different, in both child and adult. So, in comparing indicative and deontic reasoning performance, we are not merely comparing apples and oranges. We seem to be attempting an even more difficult task, of comparing the broad categories of non-citrus versus citrus fruits.

5. *Wason's Selection Task*

Cummins pursues one line of argument that is potentially relevant to assessing the relative standard of deontic and indicative reasoning. She considers how performance on Wason's selection task (Wason, 1966, 1968) depends on whether the rule used in the task is deontic or indicative.

In this task, subjects are given a rule of the form, *if p then q*, and four cards, each of which they are told has a *p* or *not-p* on one side, and a *q* or *not-q* on the other side. The subject can only see the uppermost face of each card. These show *p*, *q*, *not-p* and *not-q*. In the indicative selection task, the rule is an indicative statement about some putative rule concerning the cards, and the subject must decide which cards should be turned over in order to check

[4] This kind of argument is, for example, frequently advanced by nativists regarding linguistic information. The argument is that the child's ability to rapidly learn a highly complex formal system (natural language) is dramatically at variance with its other cognitive abilities (e.g., Chomsky, 1980; Pinker, 1994).

whether or not the rule is true. for example, the rule might be *if there is an A on one side of a card (p), then there is a 4 on the other side (q)*, and upturned cards might show *A (p)*, *4 (q)*, *K (not-p)* and *7 (not-q)*.

In the deontic selection task, the rule is a deontic statement, and it therefore makes no sense to attempt to test whether the rule is true or false, because whether the rule is actually obeyed or violated does not determine whether it *should* be obeyed. For example, the deontic rule might be: *if a person drinks (p), they should be over 18 (q)*, and the four cards might show: *drinks (p)*, *over 18 (q)*, *does not drink (not-p)* and *under 18 (not-q)*. But while deontic rules cannot be tested, the subject can, for example, select cards in order to *enforce* the rule (in this case by identifying underage drinkers).

Cummins takes the fact that people, including young children, treat deontic and indicative selection tasks differently as evidence that deontic reasoning is in some way special. But it is to be expected that different tasks provide different results. Cummins might argue that what is important is that a behavioural difference between indicative and deontic tasks emerges so early in development (Cummins, in press; Harris and Nuñez, in press). But we have already seen that early emergence in development is a very weak argument for an innate module. Moreover, even if valid, such an argument would seem equally to imply an innate module for indicative reasoning. Stronger evidence would come from demonstrating that reasoning on the deontic selection task is superior to reasoning on the indicative selection task. This is an attractive suggestion. Because the tasks are so similar (aside from an apparently subtle change of rule), they appear to provide a well-controlled way of assessing the relative development of deontic and indicative reasoning. Moreover, according to the assumption that the *p*, *not-q* card selections are the correct solutions to both tasks, the deontic reasoning task is solved successfully by young children, who fail on the indicative task (whether Cummins endorses this view is not entirely clear).

But these arguments are not persuasive. First, the indicative and deontic selection tasks are not well controlled, but are radically different tasks, with different solutions, and presumably different levels of difficulty. Second, in any case, children's deontic reasoning does not appear to be superior to their indicative reasoning, on closer analysis. We consider these points in turn.

Deontic and indicative selection tasks are radically different because indicative tasks require subjects to choose data in order to *test* whether a rule is true, while deontic tasks require subjects to take a particular attitude to a rule: e.g. to attempt to enforce it by finding violators of the rule (see Manktelow and Over, 1990, 1991; Oaksford and Chater, 1994, 1995a).

Regarding the indicative case, opinions differ concerning precisely how data should be chosen to test an indicative rule. According to a falsificationist viewpoint (e.g. Popper, 1959), which has been implicitly assumed in the psychology of reasoning (e.g. Evans, 1989; Johnson-Laird and Wason, 1970; Evans, Newstead and Byrne, 1993; Wason, 1968), the only cards that should be turned are those that could potentially show that the rule is false (specifically, the *p* and *not-q* cards). By contrast, a Bayesian viewpoint on

rule testing (Earman, 1992; Horwich, 1982; Howson and Urbach, 1989) and specifically the theory of optimal data selection (Good, 1966; Lindley, 1956, 1971; MacKay, 1992) has been used by Oaksford and Chater (1994) to argue that subjects should choose cards that maximize the expected reduction in uncertainty concerning whether the rule is true or false.[5] Given certain simple assumptions, they argue that subjects should choose the *p* card and prefer the *q* to the *not-q* card.[6] This normative proposal is in line with observed performance, and hence Oaksford and Chater (1994) argue that subjects' performance on the indicative task is rational, despite the widespread assumption to the contrary. Still other proposals concerning how to view the indicative task have been proposed (Fischhoff and Beyth-Marom, 1983; Kirby, 1994; Klayman and Ha, 1987; Rips, 1990).

By contrast, reasoning with a deontic rule involves taking some perspective to the rule, such as attempting to enforce it. There are various proposals about how to model deontic tasks (e.g. Cheng and Holyoak, 1985; Cosmides, 1989; Manktelow and Over, 1990, 1991, 1995; Gigerenzer and Hug, 1992). The most formally specified approach is given by Oaksford and Chater (1994, 1995a), who assume that utilities are assigned to each card depending on the perspective that the subject is asked to take. In the context of enforcing the rule (which is either implicitly, or explicitly, in play in most deontic selection tasks), a positive utility is associated with discovering a violator of the rule, whereas a small cost is associated with choosing to turn any card which does not turn out to be a violator (because this is a waste of 'effort'). Oaksford and Chater (1994) assume that cards are chosen to maximize expected utility using standard decision theory, where the relevant probabilities are identical to those used in their account of the indicative selection task. When the subject is enforcing the rule, this account predicts (correctly) that subjects will choose the *p* and *not-q* cards.

Whichever point of view regarding indicative and deontic tasks is considered, it is clear that the two tasks are completely different, the ways in which they are solved are different, and, at least according to Oaksford and Chater (1994), the correct answers are different! So it seems hardly surprising that performance on the two tasks differs, either for children or for adults.

Moreover, to turn to our second objection, the results found from experiments with children (Cummins, in press; Harris and Nuñez, in press) do

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5 See Almor and Sloman (in press), Evans and Over (in press), Laming (in press) and Oaksford and Chater (in press) for critical discussion of this account.

6 Oaksford and Chater (1994) show a detailed fit between their account of both the indicative and deontic selection tasks with much of the data on the selection task obtained over the last 30 years, including non-independence of card selections (Pollard, 1985), the negations paradigm (e.g., Evans and Lynch, 1973), therapy experiments (e.g., Wason, 1969), the reduced array selection task (Johnson-Laird and Wason, 1970), work on so-called fictional outcomes (Kirby, 1994) and deontic versions of the selection task (e.g. Cheng and Holyoak, 1985) and the manipulation of probabilities and utilities in deontic tasks (Kirby, 1994), and effects of relevance (Sperber, Cara and Girotto, 1995; Oaksford and Chater, 1995b).

not show that deontic performance is superior to indicative reasoning, but only that they change strategy between the two tasks, preferring the *q* card in indicative tasks, and the *not-q* card in deontic tasks. And even if deontic performance were superior, there would be no reason to assume that the tasks were equated for difficulty. Indeed, Oaksford and Chater's (1994) formal analysis suggests that the deontic selection task is much less complex (in mathematical terms) than the indicative selection task, and therefore good performance might be expected earlier in development on these grounds alone.

In sum, both children and adults use different strategies for the fundamentally different tasks posed by indicative and deontic selection tasks. But these tasks may have very different levels of complexity, and the 'correct' solutions to each may not be the same. Therefore the selection task cannot be used as a well-controlled way of comparing deontic and indicative reasoning performance. In particular, such experiments do not show that deontic reasoning is superor to indicative reasoning.

6. Conclusion

We have argued that Cummins does not convincingly show that there is an innate module for deontic reasoning. Her evolutionary argument is not persuasive. Moreover, the fundamental difference between deontic and indicative reasoning explains many of the phenomena Cummins explains by the hypothesized module. We also argue that the claim that deontic reasoning is superior to indicative reasoning cannot be made good, either in general, or in the context of Wason's selection task. This does not, of course, mean that there is no domain specific module for deontic reasoning. But it does mean that, despite Cummins' stimulating paper, the issue remains open.

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