

5 A Pre-Logical Model of Rationality

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The nurturance of rationality is among the fundamental goals of education, but one that is not likely to be effectively pursued on the basis of prevalent notions of rationality. In particular, rationality is sometimes wittingly, more often unthinkingly, equated with logic, and the nurturance of rationality is correspondingly equated with the teaching of valid logical rules. I wish to argue that logic cannot be a valid explication of rationality and that teaching logical rules cannot effectively nurture rationality

Rationality as Logic

Perhaps the simplest perspective on the inadequacy of the "rationality equals logic" position is via the recognition that valid logics cannot construct logics more powerful than themselves; in any practical sense, they cannot create new logics at all. If rationality *is* logic, then the historical development of logic itself *and* the development of logic (= rationality) in the individual are both intrinsically *nonrational*. At best, they become matters of evolutionary or historical accident, or perhaps mere matters of rhetoric, thus fundamentally undermining their claims to have any basic validity. In such a view, any alternative such product of accident or rhetoric has just as much claim to validity as does our current understanding of logic and rationality, and a rampant relativism is unavoidable. An impasse is reached at which there is little left of rationality that can claim to be rational.

Misconstrued notions of rationality, however, are not important just for ultimate philosophical groundings. They are also crucial for understanding, and guiding the teaching of rational domains of inquiry - which embraces philosophy, logic, mathematics, science, ethics, and esthetics, among others - and for nurturing the development of rationality in individuals. Models of rationality that are implicitly accidental or rhetorically based do not draw on or connect with anything intrinsic in the person or in thought. Correspondingly, they inevitably tend toward relativism (or, more likely, authoritarianism) in their approach to instruction. By definition, if there is no rational grounding for rationality, then it must be given a *nonrational* grounding or else be given no grounding at all.

I wish to sketch an alternative model of the nature of rationality that does provide for its own rational grounding and development. Furthermore,

I will indicate how the central rational domains of logic and mathematics fit within this alternative view. This view of rationality provides for its own rational grounding by explicating rationality as a development and specialization of properties that are already necessary and intrinsic in thought. Rationality is no longer a set of standards or norms imposed on thought from outside, thus having no grounds *within* thought, but emerges inherently in the properties of thought itself. Most fundamentally, it is not just that the development of thought happens at some point to evolve "rationality," but, more deeply, that there is an intrinsic *concern* in thought which, when developed, *is* rationality. The grounding for rationality, then, is in that concern, and rationality is the development and specialization of that concern.

Such a grounding will provide both a motivational and an epistemic grounding for rationality. It will be neither a purely epistemic model that cannot address the question "Why should anyone care?" nor a purely motivational model that cannot address the question "What epistemic grounding can it claim?" Instead, both questions must be answered simultaneously. I will argue, in fact, that both questions, within the right framework, are ultimately the same.

Some Thoughts About Thought

Clearly, to make good on such a promissory note, the first requirement is for a defensible model of thought, or at least a model of sufficient properties of thought to support the relevant arguments. The purportedly sufficient model of thought is elsewhere called interactivism (e.g., Bickhard, 1980a; Bickhard and Richie, 1983; Campbell and Bickhard, 1986), but it will not be developed here. Instead, I will approach the issues via the sufficient properties of thought, providing independent plausibility arguments for each of these properties before proceeding to the model of rationality which they yield. These properties are, in fact, intrinsically necessary to the nature of thought and representation according to the interactivist model, and that model, in turn, is arguably a necessary model of thought and representation per se. Space and the technical nature and complexity of some of the relevant arguments, however, preclude a full presentation here (for a brief introduction, see Bickhard, chap. 2).

There are two basic properties of mentality that form the foundation for the interactive model of rationality to be presented here: 1) learning and the development of thought are intrinsically constructive processes of trial and error, of variation and selection; and 2) thought involves the inherent potentiality of reflection, of conscious thinking about thinking.

The arguments for the variation and selection nature of learning and development are basically those for the *existence* of variation and selection

processes *and* those for the *elimination* of purported alternative models. For existence: variations and selections clearly are established as evolutionary processes. They are straightforwardly observable in any history of a dispute, say, in science, where new proposals are first put forward and later eliminated - selected out - by logical or empirical criticism; and they are present in any developmental progression in which errors occur and are eliminated. To claim that variation and selection processes exist, in fact, is not particularly controversial.

The arguments for the elimination of alternatives to variation and selection, however, are less well known, particularly for the alternative known as induction. The first alternative to be considered is really just a denial in disguise of learning or development, and is thus easily eliminated, at least insofar as it is correctly recognized: the supposed "alternative" is prescience or foreknowledge. This position contends that there is neither learning nor development, but that all possible knowledge is already available. However, because learning and development certainly seem to occur, this position faces serious *prima facie* implausibility. Nevertheless, in the contemporary version of innatism, such a position has recently gained much ground. A *valid* innatist model is simply a model of how some specific knowledge arose, or could have arisen, by evolutionary processes. Such models have important roles to play in understanding how humans and other animals function and develop. Innatists, however, that proceed by arguing that some or all of knowledge *cannot* develop, and therefore that it must be all already present (innate) are fundamentally arguing that such knowledge cannot come into being at all (Bickhard, chap. 2; Campbell and Bickhard, 1987; Fodor, 1975, 1981; Piattelli-Palmarini, 1980). If such arguments are at all valid, then such knowledge cannot come into being via evolutionary variation and selection any more than it can by developmental variation and selection, so innatism is not an available solution. Such models require an external agency to insert something akin to knowledge of Plato's forms at some point in evolution or in development. Such models are not scientific, they are supernatural.

The primary alternative to variation and selection as the process of creating new knowledge is the supposed process of induction. Induction is the impressing of patterns from the environment into the mind, thereby giving the mind knowledge of those patterns. Induction is also a presumed form of "rational" justification for such knowledge. The notion has fared badly in both of its forms as origin *and* as justification of knowledge, but I am primarily concerned here with induction as origin. The argument against it is quite simple: in order for a mind to notice such a pattern in the environment, the possibility of that pattern must be already epistemically available to that mind; otherwise, it would not in fact be noticed. If mind must bring the possibility of that pattern to the world as a kind of hypothesis to be tested,

then we have a version of variation and selection after all, not simply a passive induction of knowledge (Popper, 1959, 1965, 1972, 1985).

By both existence and elimination arguments, then, the development of thought and representation must occur via some forms of variation and selection processes.

Arguments for the inherent potentiality of reflection are in some senses simpler than for variation and selection, and in certain other senses more complex. They are *simpler* in that such a possibility is *prima facie* not in question; any reflection on the issue at all already settles the issue. At best it might be argued that certain aspects of thought are not available to direct reflection, but that too is not seriously in question (e.g., neurochemical foundations) and does not alter the basic argument to be presented. The issues are more *complex* in that, however incontrovertible the *fact* of reflection is, it is extremely difficult to *account* for such consciousness or, for that matter, to even characterize what it is. Most models, together with programmatic frameworks for modeling such as contemporary information processing approaches, not only ignore consciousness in fact, but are fundamentally incapable of modeling it in principle (Campbell and Bickhard, 1986). Perforce, they cannot provide guidance for understanding the nature of, or for the nurture of, anything that intrinsically involves consciousness such as, in particular, rationality. Interactivism does claim to model the nature and the evolution of consciousness (Bickhard, 1980b; Campbell and Bickhard, 1986), but again, only the potentiality for conscious reflection will be needed in the ensuing argument, and that is established in the very asking of the question.

The Nature of Rationality

The model of rationality that emerges from these two properties is simply that of *reflective* epistemic variation and selection, or meta variation and selection. It is this notion that will be presented and elaborated.

Variation and selection involves both processes and principles of variation and processes and principles of selection. But because all evolution and development ultimately rest on variation and selection, any particular constructive variation processes must themselves be the products of previous variation and selection constructions. The same holds true for the selection process and principles, but there is a deep asymmetry between the relationships between successive constructive variations and the relationships between successive selection processes and principles.

New *constructive* variation processes are those that have *satisfied* whatever new *selection* principles might have been constructed. These may be, in some sense, variants on previous such constructive processes, or they may have no carry over or accumulation of content at all. The positive

contents of variational constructed processes can, in principle, change unpredictably and radically from one version to the next. To deny that possibility is, in effect, to revert to prescience: to claim that some parts or aspects of current knowledge are, in fact, ultimately true and need never be changed. Common sense and the previous argument against prescience, as well as the long history of science, belie such notions.

Successive principles of *selection* on the other hand, of *criticism* when rendered in language, always have a very special relationship with preceding principles of selection. In particular, new critical principles always *apply* to earlier such principles. They may apply in such a way as to affirm earlier principles (perhaps strengthening their grounds or broadening their scope); or they may apply in such a way as to *infirm* earlier principles (perhaps undermining what was taken to be a support or presenting a counterexample to a claim); or they may apply so as to affirm and infirm simultaneously (for instance, if a previous principle were to be differentiated into two or more special versions with differing scopes of application, thus infirming the earlier claimed general scope, but affirming the basic common form of the principle). Fundamentally, however, higher-level critical principles are *about* lower-level, earlier, critical principles. It is this *aboutness* that intrinsically requires the potentiality of reflection. Conversely, given a variation and selection process together with the possibility of reflective consciousness, critical principles arise simply as the lifting of variation and selection (especially selection) into the realm of conscious process.

The Necessity of Rationality

Rationality in this sense of the progressive construction of critical principles, and of the succession of positive contents and constructive processes that successively satisfy them, is a necessary tendency of the development of thought. That there is an inherent developmental tendency to progressively construct critical principles follows immediately from the explication just given. Insofar as variation and selection are intrinsic to mind, and insofar as the possibility of conscious reflection is intrinsic to mind, then *reflective* levels of variation and selection are also intrinsic potentialities. But I am proposing that reflective variation and selection, with the intrinsic primacy of the principles of selection, i.e., critical principles, *is* rationality. A tendency for the development of hierarchies of critical principles, then, is intrinsic to thought, via its intrinsic characteristics of variation and selection constructivism and potentiality for reflection.

Furthermore, internal principles and processes of selection are intrinsically motivational. At the lowest level, they are the processes involved in appreciation of success, failure, pain, hunger, loss, and so on. At higher levels of reflection, critical selection principles are not just relative to the

environment, but they are *about* the properties and processes and even the very constitution of the overall system or its parts. They are satisfied, or fail to be satisfied, by the person and by his or her various aspects as a person. Satisfaction of these principles is *sought* via instrumental and self-constitutive efforts. Such selection principles, then, do not just function mechanistically, they constitute the basic carings and concerns of the person. As proposed in Campbell and Bickhard (1986), they constitute the basic values of a person, which, in turn, constitute the core of a person's identity, and form the leading edge of further development. It is nontraditional to consider *epistemic* values, as is being proposed here, instead of ethical values in the narrow sense (which are fundamentally "just" epistemic values about ethical issues, or ethical principles that "fit" those epistemic values), but that is simply an unfortunate legacy of the Kantian heritage in which ethics is separated from the fundamental concerns of the person (MacIntyre, 1981). Critical principles, then, as values, as higher order goals, and as higher order selection principles, function deeply and intrinsically in the motivational carings and concerns of persons.

The Rationality of Rationality

However much the rationality of critical principles may be an intrinsic tendency and motivational involvement of persons, it remains to inquire as to the self-consistency of this notion of rationality. In what sense is the development of a hierarchy of critical selection principles a rational development? Is that sense consistent with the very model of rationality being proposed? The answers to these questions are again simple in principle once some misconceptions are eliminated. Most commonly, such questions are asked with the presupposition that any answer must involve a model of the justification of the "rational" products, and that such justification, in turn, involves some demonstration of absolute or relative movement toward Truth. The paradigm case is again that of induction, which is supposed to provide greater and greater assurance or probability of truth the larger the range of data or experience upon which it is based, and is assured to converge on Truth in the limit. Models of movement toward Truth have universally suffered failure. The reasons for such failure have most often been taken to be either technical, and therefore correctable by a technical fix, or at least correctable by some modified version of the notion of justification. In some "radical" attempts, some other positive content is substituted for Truth as the ultimate epistemic goal-pragmatic success or problem-solving success, for example (e.g., Laudan, 1977, on scientific rationality).

The issues involved here are too ramified and complex to address thoroughly, so I will suggest my own diagnosis of this class of failures. The

contended solution then follows readily. The basic diagnosis is that standard approaches to the nature of rationality are defined in terms of some sort of positive content such as truth, pragmatic success, and so on. Hence the internal consistency of such models must be gauged in terms of movement toward a totality or purity of such contents or in terms of accumulation of such contents. Unfortunately, we cannot know what those limit points are or what part of our current contents partake of the "correct" contents: to already know that would constitute prescience. But without knowing in advance what the correct content should be, or at least in what "direction" it should lie, it becomes impossible to ensure that rational development is in fact progressive according to the purported definition of rationality. Without such assurance, however, in at least a probabilistic form, such models of rationality cannot support their own claims to rationality: they are reflexively inconsistent.

The solution is already inherent in these explications. The rational progressivity of rationality lies not in accumulating positive content, nor in moving toward positive content, but instead in moving *away* from *error*. The basic character of variation and selection is not to ensure a particular content in the surviving constructions, but to ensure in some minimal sense the avoidance of error, of eliminative selection. Variation and selection processes progress in their capacity to satisfy selection criteria. From the standpoint of meta variation and selection, the hierarchy of critical selection principles *constitutes* the individual's (or society's) knowledge of what sorts of errors can be made and should be avoided. Progressive knowledge is knowledge that satisfies more elaborated and advanced critical principles, that avoids more sophisticated and advanced sorts of error. This model of rationality guarantees a progressive tendency by the criterion of movement away from error. Rationality as meta variation and selection, then, *does* address its own self-consistency, its own selection criteria for rationality, and it satisfies them.

The Rationality of Necessity

As one implication of the critical principle model of rationality, I will consider *necessity*. Necessity, in its various forms, partakes of the intrinsic tendencies toward rationality. There are intrinsic tendencies toward necessities and, more deeply, toward the development of critical principles for necessities.

One of the fundamental functions of selection criteria is to encounter *exceptions* to the current system, cases or instances in which the system fails. Construction of further variations then attempts to avoid such exceptions, and further critical principles attempt to anticipate such exceptions. That further constructions attempt to avoid such exceptions derives directly from

the nature of variation and selection. That construction of further critical principles attempts to anticipate such exceptions follows from realizing that critical principles stand in the stead of potential eliminative selections from whatever the system interacts with or is about. *Satisfying* critical principles is in the service of *avoiding* relevant lower level selections. Encountering an exception, then, is not only a failure of the system, it is also a failure - at least of scope, if not of content - of the selection principles which that system is taken to satisfy.

The development of critical principles, then, involves an intrinsic tendency toward processes and representations without exceptions - toward *exceptionlessness*. But exceptionlessness is necessity. Having no exceptions across some domain of potential exceptions constitutes what we mean by necessity, and differing such domains provide differing varieties of necessity: pragmatic necessity, physical necessity, logical necessity, moral necessity, existential necessity, and so on. Furthermore, as such criteria differentiate and specialize as distinct critical principles, not only are necessities (as properties of system and representation) tendencies of rationality, but values - critical principles - of necessity likewise are part of that intrinsic developmental tendency.

Necessity is a limiting case of one aspect of rationality - the aspect of having no exceptions. It is a limiting case not only in the sense of constituting a point beyond which no further improvement is possible - no exceptions is the best there is with respect to this criterion - but also in the sense that there can never be any absolute assurance that that point has been reached. For a system to not be selected against by a principle like necessity requires only that no exceptions or likely exceptions be currently known; it does not guarantee that no exceptions will be discovered in the future. Not being currently selected against by a principle is not the same as ultimately satisfying that principle. There is an asymmetry here that is deeply similar to Popper's distinction between empirical confirmation of a scientific theory and falsification of a theory: no amount of accepted confirmation is compelling, while even a single accepted falsification is compelling. It is the same asymmetry at a conceptual and metaconceptual level (empirical falsification can be viewed as eliminative selection against an empirical criterion, an empirical value).

This asymmetry is important because it allows for the rational employment of critical principles as selection criteria that we can never be assured are, in fact, satisfied - that we can never, with philosophical certainty, *believe* to be satisfied. Many important epistemic values - such as necessity, truth, realism, and so on - partake of this asymmetry, and are correspondingly impossible to incorporate into positive belief-focused explications of rationality. There can never be enough reason to believe, say, that contemporary physics describes reality (especially given the ultimate

failures of even the best supported physics of the past), but it will nevertheless still be rational to apply realism as a critical principle against current theories: discovering their failures to meet the demands of realism is an increase in knowledge, and leads to further constructive improvements.

The Nurturance of Rationality

The dialectic between variations and selections proceeds apace, inherent in the nature of life and of thought. The origins and developments of explicit *metavariations* and selections, however, thus of explicit rationality, are only an intrinsic potentiality and tendency, one that may or may not be actualized or that may be actualized to varying degrees. The critical principle model of rationality yields some distinct implications concerning the conditions that might encourage and nurture that development.

The first implication is a straightforward extension of the model to the social realm. Social norms of openness to criticism tend to elicit attempts to discover criticisms and also to anticipate and avoid potential criticisms; they tend to lead, therefore, to the discovery of critical principles and of ways of thought that seem to satisfy or to fit those principles. This point would seem to hold just as much historically, as with the ancient Greeks and their prodigious contributions to philosophy (Annas, 1986), as it holds for family or classroom interactions.

A second implication concerns the relationships between rational domains and the applicable critical principles. Knowledge of the contents of such a domain *without* knowledge of the relevant critical principles within which those contents are presumed to fit is knowledge without motivation or understanding. The critical principles provide answers to the "Why bother?" and "Why this way?" questions that make rational knowledge rational. Instruction that ignores such concerns is intrinsically, even if inadvertently, authoritarian and rote. Too often, of course, children (*and* adults) are left to discover the relevant principles on their own. Commonly, such material simply remains arbitrary, irrelevant, and boring.

A third implication is, in effect, a deeper corollary of the second. The hierarchy of critical principles for a rational domain is intrinsically historical; it is an implicit sedimentation of the rational historical development of the field. Correspondingly, a powerful perspective on any rational domain will be the historical perspective on its development. To understand what problems were being addressed, what assumptions were being made, and what critical constraints were being observed in creating the field (including those that overthrew previous conceptualizations of problems, assumptions, and constraints) is to know the field as a vital domain that the individual can connect with and potentially participate in. The historical perspective is grievously absent in contemporary conceptions of education, and, even when

it is present, the critical principles involved are rarely explicated. More typically, the historical succession of positive contents is simply recounted, leaving the student with another arbitrary, irrelevant, and boring collection of items.

The fourth and last implication that I will address follows from the point that although rationality is an intrinsic *tendency* of thought and develops from an intrinsic *concern* of thought, rationality is *not* an intrinsic *part* or *aspect* of thought per se. Rationality is an epistemic and inferential self-disciplining of thought, a *meta*-development of the selectional aspect of thought, not the essence of thought. This view contrasts, for example, with the view in which rationality is equated to logic and logic is taken to be (inherent in) the rules of thought. In this view, and in others in which rationality is a "part" or domain or form of thought, rationality is conceived of as being in opposition to the "passions." The implication that follows from the interactive model, in contrast, is that rationality emerges out of creative engagement with problems, perhaps even ludic or fascinated (passionate) engagement. In other words, the standard opposition between creativity, emotions, curiosity, and so on (the passions), on the one hand, and the discipline or domain of rationality, on the other hand, is a false opposition. The two sides of the supposed opposition are in fact the aspects of the constructivist variations and the motivated selections, respectively, that are intrinsic to *all* of thought. *All* such aspects will be evoked when learning proceeds within the framework of motivated problems; problems, in turn, will *be* motivated insofar as they connect with the current knowledge and values (epistemic and otherwise) of the person involved. Knowledge emerges because someone has reason to care or to be interested; this model suggests that that is the most powerful manner in which rationality will develop as well.

Conclusion

Contemporary notions of rationality tend to be explicated in terms of the rational contents of positive knowledge. This leads to both philosophical impasses and educational distortions. Philosophically, for example, such notions cannot account for the rationality of their own development. In terms of positive contents, such as rules of logic, rationality would have to have already been in existence in order for it to have come into existence in a rational manner. Educationally, the nurturance of rationality becomes bare instruction in those contents, which leaves them unmotivated and not understood. These points are deeply intuitive once made, but insofar as they have conflicted with dominant notions of rationality, those intuitions have had no guidance. Rationality as critical principles dissolves such impasses and resolves such educational distortions.