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CREDIT FOR MAKING A DISCOVERY

1. The Problem

How is one properly to allocate credit for making a discovery in science or elsewhere where the conjoint effort of several individuals is involved? When a group of investigators cooperates in making a discovery, how should the credit for this achievement be apportioned among them to assure that everyone receives their proper share?<sup>1</sup>

The problem being considered here is not that of assessing importance—of determining how much credit there is to go around. That is something else again. The present problem, rather, is that of how that credit, be it great or small, should be allocated to the parties responsible for the discovery at issue? It is, accordingly, not the amount of credit but its distribution that is at issue.

Various interesting findings are available to illuminate how credit for discoveries in matters of science and learning is actually bestowed. One example is the Matthew Principle of the sociologist Robert K. Merton to the effect that fame attracts credit: that the tendency is for the well-known to be recognized while the obscure are allowed to remain in obscurity. And there is also the Law of Eponymy of the economist Stephen M. Stigler which has it—with only mild exaggeration—that “No scientific discovery is named after its original discoverer.”<sup>2</sup> However, such empirical observations, interesting though they are, do not concern us here. The present deliberations abstract from the sociological question of how credit for discoveries is allocated in actual practice to focus upon the ethical question of proper allocation—of how such credit *ought* in theory to be allocated. It is the issue not of *possession* but of *desert* that will preoccupy us here.

Just why does this issue of credit for discoveries matter—what is it that does (or should!) turn on this? For living researches primarily two things: enlarged *opportunities* (especially for such

benefits as research support and career advancement) and enhanced *recognition* (in particular by way of prizes, honorary degrees, academy memberships, and similar accolades). And there’s even something in it for the dead as well, since credit for achievements is one way—and ideally the best way!—to gain a place in the history books. And so for theoretical and practical reasons alike we should and generally do want to reward achievement in matters of discovery, and it is by granting credit that we begin the process of assessing achievement here.

One possible misunderstanding must be averted from the start. The focus of present concern is with strictly *epistemic* credit for discovery. The pivotal question is that of actually making the discovery. Other subsidiary issues such as “Was it made by good means or bad?” “What was done with it once made?” and “Is the sort of person who made it someone admirable or detestable?” are all beside the point of present concern.

Consider an illustration. We have all heard of Hodgkin’s disease, of Alzheimer’s disease, of Down’s Syndrome. Less widely known is Reiter’s syndrome consisting of urethritis, which usually comes first, followed by arthritis and conjunctivitis. Occurring mainly in young men it is generally associated with the organism *Chlamydia*, and is named after the German doctor Hans Conrad Julius Reiter, (1881-1969) who identified it while an army physician in World War I. There is some discussion about its having been identified earlier, but this is beside the point of the present push to rename the syndrome and de-credit Reiter on account of his later activities as a Nazi and a concentration camp doctor. The question that people urge is “Should a war criminal be rewarded with an eponymous distinction?”<sup>3</sup> However, this sort of question, however, interesting, is *not* what is on the agenda here. Our concern is solely with the epistemic question of who is to be acknowledged as a discoverer,

and not with the social-policy question of how the envisioning society is to respond by way of reward or penalty.

All of this said, the problem now before us is thus: When a group of investigators makes a discovery, how ought credit for the cognitive contribution at issue be divided among them?

"Very carefully" had best be our immediate response here for there are a great many complex issues that have to be taken into account.

First off there is, of course, the preliminary matter of how much credit there is to go around. Discoveries come in different sizes: large, medium, and small.<sup>4</sup> In fact, they have rather different dimensions of merit, since they can be interesting or uninteresting, important or unimportant, useful or useless, easy or difficult. Since our intent is here focused on the cognitive dimension, it is *importance* and *difficulty* that will be at the forefront of concern.

After all, interest as such is almost unavoidably subjective: it hinges on what people happen to *find* interesting. And utility can be either theoretical or applied. Practical utility is a matter of applied science or technology and as such addresses other than strictly epistemic issues. Theoretical utility, by contrast, comes down to facilitating the acquisition of knowledge pure and simple. And just this is pivotal for determining importance. For importance is best described by a double recursion: A discovery is cognitively important in a given branch of inquiry if the information it provides: (1) sheds light on one of the big issues definitive issues of the branch of inquiry; or (2) bears illuminatingly on an important finding; or (3) facilitates access to an important discovery. This complex formula provides what is, in effect, a (dually) recursive definition of importance.<sup>5</sup> Thus, for example, since medicine is clearly a significant domain of inquiry, and since information regarding the maintenance of health is its definitive object, a discovery is important when (1) it sheds light on this, or (2) it illuminates something else which itself does so at some iterative remove, or (3) it facilitates the realization of something which does so at some iterative remove.

As regards that starter set of important questions, it should be observed that "importance" of a question turns on the extent to

the transformation that its answer effects within the domain of inquiry at issue. But two very different sorts of things can be in view here, either a mere growth or *expansion* of the relevant body of knowledge, of a *revision* of it that involves replacing some of its members by contraries thereof and readjusting the remainder to restore over-all consistency. This second sort of change in a body of knowledge (*revision*-change rather than mere *augmentation*-change) is in general the more significant mode, and a question whose resolution forces *this* sort of change is virtually bound to be of greater importance or significance than a question which merely fills in some of the *terra incognita* of our knowledge.

Importance is accordingly something comparative. And its assessment as greater or lesser will depend. As regards item (1) it depends on the amount of light that is shed, and as regards items (2) and (3) it will depend on the length of the induction chain that ultimately grounds it in (1) relating matters. It is a complex and challenging issue to work out the details for assessing importance but this is not the place or time to do so. For present purposes we have to suppose that the reader can recognize an important discovery as such when it comes to view. So much, then, for importance. Let us return to the issue of assessing credit in matters of discovery.

## 2. Principles for Assessing Epistemic Credit

The cardinal principles at issue in assessing the epistemic credit of individual discoveries are relatively straightforward. For this issue is something that depends primarily on two factors:

1. the inherent significance—that is, the importance—of the finding in question,
2. the difficulty of arriving at this finding issue.

As we have seen, importance is a matter of illumination—of helping to shed light on significant issues. Difficulty, by contrast, is a matter of how much effort and resources must be expected for solving the problem or making the discovery at issue. The expenditure of talent, time, and resources is the crux. And it should be clear that the question here is not that of how much effort an investigation has actually expended. For

those investigators might well have expected for more than necessary and reached an easy goal by a roundabout path. Difficulty is a matter of how much effort *needs* to be expended for arriving at the result.

However, in assessing credit the weight of both these two factors—importance and difficulty—is uneven. For while both count, importance is very much the weightier factor here. A lot of credit goes to making an important discovery even when its realization was rather easy. And very little credit goes to a trivially important discovery even when its realization was difficult. But an important discovery that was difficult to realize gets extra points. As this perspective shows, epistemic credit for discoveries is a fundamentally normative conception that hinges on the factual matter of the nature of the contribution and the mode of its achievement.

And with multilaterally collaborative/cooperative discoveries, these two factors of importance and difficulty still remain pivotal. Between them they determine “how much credit there is to go around,” so to speak, and before slicing the pie we must determine its size. However, some further important preliminaries must still be dealt with prior to addressing the issue of allocation.

As such a perspective indicates, credit for scientific discovery depends simply on the result achieved and the difficulty of achieving it. The agent’s intent and expectations do not matter. Fleming was not looking for penicillin; Becquerel was not looking for radioactivity. But with epistemic credit for discovery it is results that matter and intentions are irrelevant.

And this is particularly important where multilateral efforts are involved. For in general there is no such thing as a group intention or a group expectation. And in fact group members generally ride off in various directions here. Nevertheless credit is there for the group: what they collectively discover they collectively get epistemic credit for without reference to intentions.

### 3. Distributive vs. Collective Cooperation

One further preliminary must also be addressed. For there are two very different sorts of multilaterally cooperative investigations since problem-solving

effort can proceed either collectively or distributively. At this point the focus shifts to *given* discoveries and the question shifts from “How much credit is there to be divided overall?” to: “How is the available credit—but small or large—to be divided among those who participate in the process of discovery?”

It is helpful to introduce a bit of terminological regimentation at this point. For it is useful to distinguish between *distributive cooperation*, which is simply coordinated effort towards the realization of a common goal, and actual *collaboration* or *collective cooperation* which is a matter of working together with interactive feedback towards such a goal. The term cooperation will accordingly serve as a broader umbrella to cover both of these cases.

Distributive problem solving occurs when problems are disassembled into separate components that are addressed separately—often by distinct investigators. With such cooperation the overall problem is divided into component sub-problems subject to a division of labor. Perhaps because variant specialties are at issue, each investigator (or investigative group) does its work separately and their efforts, though coordinated, are disjoint, with different contributors providing different pieces of the whole. Thus with the lexicographic problem of explaining the orthography and meaning of English words we may have a research mode where investigator No. 1 may take on the A’s, investigator No. 2 the B’s, and so on. Or in a decoding effort, for example, one investigate works on verbs and adverbs another on nouns and adjectives, another on particles, etc.

A very different situation obtains when cooperative problem solving proceeds collectively and collaboratively. Here there is not just cooperation but actual teamwork or collaboration with different operators fusing their efforts in conjoint interaction. Collaborative work on a crossword puzzle is a good example. As anyone who has tried it knows, the relationship of feedback interaction renders this something far more effective than simply compiling the results of different individuals working separately. Problem solving here proceeds interactively with the efforts of different contributors inter-connectedly inter-twined with that of others.

Of course what matters most with distributive credit for a discovery is actually making it. Consider a schematic example. Let us suppose that the situation before us is a search process for a particular problem-resolution that is emplaced within an overall solution space having the structure of a tic-tac-toe grid that maps out the range of possibilities:

|   |   |   |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |

Now suppose a situation where two investigators *X* and *Y* work in an independent but coordinated way. Investigator *X* locates the solution in the first row, and *Y* locates it in the middle column. Between them they have solved the problem by identifying 2 as the solution. Each has eliminated six possibilities and the work they have done accordingly is (so we may suppose) equally laborious. They will thus divide the credit 50:50.

But now suppose that *Y*'s work had, like *X*'s, also located the solution in the first row. Then of course the problem would remain unresolved: there would have been no discovery to be credited. To be sure, the useful work done by *X* and *Y* yield some credit for each of them, namely credit for their respective (identical) finding, but no credit for the actual discovery of a solution. But now note that, as far as what *X* does is concerned, there is no discernible difference between the two cases. Whether or not there is discovery—and therefore whether or not any credit for discovery is to be available—depends not on what those investigators individually do, but depends holistically on the overall relationship of their respective contributions. This schematic little example is thus instructive because it makes it transparently clear that what matters for collective discovery is not just individual effort or even identical contributions but the overall result.

There are, of course, some problems that cannot be factored into pieces. Such systemic problems as, for example, explaining the origins of World War I must be dealt with holistically: it makes no sense to address the historical, political, colonial, social, military, naval and

economic aspects of the problem in separation. By their very nature as such, these holistic problems must be treated as a unit. They cannot be disassembled into bits and pieces. Here multilevel cooperation has of necessity to take the form of teamwork.<sup>6</sup>

#### 4. Principles of Credit Allocation

With these preliminary clarifications in view we can finally turn to our main task. For the fundamental principles of credit allocation for discoveries are now readily discerned. They are principally two:

1. When a group finding stems from *collective* cooperation, credit cannot be allocated differentially. It belongs to the group members indivisibly, collectively, and equally: they all share and share alike with respect to the aggregate outcome. They are, to speak in legal terminology, *tenants in common* of the discovery at issue.<sup>7</sup> In fact it would be inappropriate here to distribute partial credit to the individual investigators because in the conditions *ex hypothesi* at issue there is not practicable way of doing so. Credit for genuinely collaborative teamwork is effectively indivisible and belongs to the group-as-a-whole and to individuals only as members thereof. However —

2. When a group finding stems from *distributive* cooperation (in which case is must of course address a factorable problem), then the individual contributors simply gets the credit that goes with their piece (or pieces) of the problem. Here the whole is equal to the sum of its parts and the parts get evaluated separately as making so much percentage of the whole.

But what of the organizer of a multilateral research effort? Does this individual not deserve much of the credit? Surely so. For what we usually have here is simply a divisible effort with one individual or group providing the planning and organization of the research and another group carrying out the work. This being so, the overall process of problem-solving is divisible into two sectors: devising the plan and then carrying it out. And then each party gets credit for its own

contribution: the organizers for the organization, the implementers for their implementation. Neither party deserves credit for the contribution of the other: the organizers get a lion's share of credit for the conceptual design of the inquiry, the implementers get the residual credit for whatever accomplishments are invested in the execution of the plan. And, of course, when the organizers also function as active investigators and are themselves members of the research team, then they deserve whatever additional credit goes with the discharge of this role.

In sum, with collective collaboration the credit for discovery will also have to be collective, while with distributive collaboration it will have to be distributive by shares. The mode of problem-solving collaboration dictates the mode of credit-allocation that is appropriate. And, in particular, while there may be much credit in the results of an inquiry that proceeds by way of the division of labor inherent in a distributive collaboration, nevertheless the contributors can here claim credit only for the particular finding that is their personal contribution.<sup>8</sup>

For the sake of a schematic example, consider once more the search for a problem-resolution emplaced within an overall solution space that has the structure of a tic-tac-toe grid:

|   |   |   |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |

In situations of this generic structure we generally have a problem that is factorable. And we may again suppose that our two investigators *X* and *Y* work separately. Now let it be that investigator *X* determines that the solution must lie on a diagonal. And investigator *Y* determines that it must lie in the middle row. Between the two they accordingly fix it in the middle. They have solved the problem and between the two they get credit for the whole. But each gets credit only for the particular piece—the particular sub-problem resolved by himself. And so, overall the credit is now divided as follows. *X* eliminates 4 possibilities (and thus 4/9 of the whole spectrum) while *Y* eliminates 6 possibilities (and thus 6/9 of

the whole spectrum). Thus *Y* makes a contribution half again as large as *X*'s. (Of course this assumes that all else is equal, which is assuming a lot.)

With collective contributions, by contrast, where interactive teamwork is at stake, the credit cannot be divided. The group-as-a-whole will be the bearer of whatever credit there is. (In legal parlance, the contributors will own the credit in common and not by separable shares, the distinction being akin to that between a corporation and a partnership.)

Yet why not say that if there are *n*-interactive collaborators each simply gets one-*n*th of the credit? Because it makes no sense to so do. Participating with various others in teamwork leading to a great discovery is just not the same sort of thing as making one modest-size discovery on one's own. With genuine teamwork, credit for the collective achievement belongs substantially to the entire team—that is to everyone. To be sure, it is not that the discovery is to be credited *only* to the team and that individuals as such do not figure—that they deserve no personal recognition in the usual ways (raises, prizes, honorary degrees, etc.). It is, rather, that they deserve this as members of the team and that such good things should come to them all on a basis of equality ("all for one and one for all").<sup>9</sup> With teamwork credit belongs to the team as a whole and thereby to its individual members as members thereof: the credit is shared, but not divided.

## 5. Fairness Sustained

With distributive collaborations, credit for discoveries is thus comparatively unproblematic since contributions can be broken apart and credited to specific individuals. Here the classic principle of fair-share purportism obtains, with credit being divided in line with individual claims. However, with collective credit for solving non-factorable problems the situation is more complex. Here there is no proportioning of shares. Nevertheless, the classic principle of proportionality/fairness is not actually violated. For *here there actually are no competing individual claims*. With collective collaboration, claims have to be made in the first instance on behalf of the group-as-a-whole and credit then

allocated to individuals as members thereof. The claim of each individual participant is simply that of having functioned as an integral and essential member of the entire team. And the credit he gets is a matter of shining as a moon reflecting the bright sunlight of collective achievement.

Accordingly, it needs to be stressed that the special situation of teamwork in discovery does not violate the classic fairness/proportionality principle of traditional distributive justice that allocations be made in accordance with claims. And the reason for this rejection of proportionality lies in the way in which claims work in this domain—namely, that with authentically collaborative teamwork there simply are no partitive and separately distributed claims.

But how is this difference in the ground-rules for credit allocation, as between distributive and collective collaboration (teamwork) to be explained? The rationale at issue is clearly functional and pragmatic. In cases of the division of labor we want to provide each party with the strongest possible incentive for doing their individual part competently and efficiently. And so it makes good sense to give them full credit for their own contribution and thereby not to grant them any share in somebody else's. With teamwork, however, the interests of functional efficiency point in a different direction. Treating the team as an integral unit—with achievement and failure belonging to the whole—creates conditions where the coordinated efforts of the group are powerfully motivated in the pursuit of a shared objective. Effectiveness in working together is the crux so that here efficiency and effectiveness is maximized by giving that unifying goal priority over the particular individual contributions of the various collaborators. In sum, the difference in distributive procedure roots in the different goal structures of the respective modes of investigative procedure. The efficacy of different procedures in realizing different sorts of objectives is the key.

This state of affairs has important ramifications.

## 6. Moral vs. Epistemic Credit: A Difference of Aims

Those fundamental principles of credit allocation with discoveries may seem straightforward, but in particular cases the overall situation can be quite

complex. For example, consider once more a problem-resolution space with the configuration of a tic-tac-toe grid. And again suppose that we have two investigators *X* and *Y* working separately in noncollaborative cooperation. And now let it be that *X* determines that the solution lies in column three. But *Y* cheats. He claims to have shown that the solution must lie in boxes 2 or 3, whereas actually all that he is entitled to claim on the basis of the information he has developed is that it lies somewhere in the first row.

Note that:

1. Between the two of them they have solved the problem: as a group they get full marks.
2. As far as individual epistemic credit goes, their shares are equal. By hypothesis each has succeeded in eliminating six possibilities.
3. However, as far as ethical or moral credit goes the inquiry as a whole is contaminated by *Y*'s cheating.
4. Nevertheless, from the ethical point of view *X* is altogether blameless: he is innocent as the driven snow. And so —
5. *Y* must bear the entire burden of ethical discredit.
6. Yet all the same *Y*'s moral culpability and cheating in fact nowise afflicts or contaminates the problem resolution collaboratively arrived at. Nor does it abolish *Y*'s *epistemic* credit for his contribution.

The example brings to light the very different *modus operandi* of moral and epistemic credit. The two types of credit function on entirely different principles. This issue deserves closer scrutiny.

To begin with, it is clear that markedly different policies and procedures are at issue with epistemic and moral credit. They have a different rationale, seeing that very different aims are at issue in the moral and the epistemic enterprises. With inquiry we want results: our epistemic concerns are product oriented. With morality, by contrast, we want good procedure: our moral concerns are process oriented: we want people to comport themselves properly. Pragmatically or functionally different enterprises are at issue. Moral credit is process driven: what people endeavor to do is paramount. By contrast, epistemic credit is product driven: the inherent value of findings is paramount.

Let us consider the matter in its goal-oriented perspective. Seen as a functional enterprise, the aim of morality lies in inculcating actions that safeguard the real interest of people by way of serving the best interest of the community. Morality seeks to canalize and direct the actions of people by guiding and goading them into doing what is right by way of assuring the general interest of the group. The crux is that process (what people do) is paramount here with the issue of outcome (how things work out) pretty much irrelevant. General practices are paramount here. When you entrust your money to me, I am morally bound to return it to you when the time comes—even were I to believe or suspect that you will squander it or use it for an illicit purpose such as bribery.

Analogously, inquiry too is a functional enterprise. But it has a very different sort of goal-structure—one that prioritizes knowledge as such. For the discomfort of unknowing is a natural component of human sensibility. To be ignorant of what goes on about us is almost physically painful for us—no doubt because it is so dangerous from an evolutionary point of view. It is a situational imperative for us humans to acquire information about the world. The requirement for information, for cognitive orientation within our environment, is as pressing a human need as that for food itself. The basic human urge to understand—to make sense of things—is an integral and characteristic aspect of our make-up — we cannot live a satisfactory life in an environment we do not understand. For us intelligent creatures, cognitive orientation is itself a practical need: cognitive disorientation is physically stressful and distressing. And inquiry—the means by which we satisfy this need—is accordingly product driven. The advancement of knowledge is the paramount for the enterprise of inquiry.

As such a perspective shows, morality and inquiry are different enterprises with very different aims and purposes in view. Let us survey the lay of this land more closely.

## 7. How the Difference of Aims Explains the Difference Between the Principles at Work with Moral and with Epistemic Credit

The difference between the goal-structure of the cognitive and of the moral enterprises provides

the rationale—the explanatory basis—that accounts for the difference in the principles of credit allocation that are operative in these two domains. Thus consider:

### 1. *There unquestionably is such a thing as moral discredit; but strictly epistemic discredit does not exist.*

Moral credit is bi-polar. It has a positive side (praiseworthiness) and a negative side (blame). Epistemic credit is uni-polar: there is no discredit here: there is no such thing as wicked knowledge. And the reason for the difference is simple. We want to bind people to the moral rules. But in the epistemic case we want to have people go their own way, take chances, run risks. Disincentives to innovation must be sidelined and general rules disregarded. Inquiry wants results. Ethics insists that like cases be handled alike. But not inquiry. Here uniformity is not at a premium. Quite the reverse. If group A pursues strategy #1, one would want group B to pursue strategy #2. We prize creativity, originality and innovation; we disapprove duplication of effort.

### 2. *Moral credit is always individual; epistemic credit need not be so, for while it is individual with distributive cooperation, it is collectivized and indivisible with teamwork.*

In point of moral credit (or discredit) individuals stand on their own feet. Strictly speaking in moral matters there is no group credit/discredit! the moral credit/discredit of groups is always that of the individuals that belong. But epistemic credit can belong to a group holistically and resist a distributive breakdown to individuals. And the rationale of this difference is straightforward. Where *individual effort* is paramount we want to maximize personal incentives. But where *interactive collaboration* counts we want to sink individual self-preoccupation in the interests of cooperation towards the common goal. And so from the angle of investigative teamwork we need a disincentive to “I’ll keep my share, thank you” egoism as counterproductive to the enterprise.

With the *interactive collaboration* at issue in investigative teamwork it makes sense to sink individual self-preoccupation in the interests of

cooperation towards the common goal. And so from the angle of investigative teamwork there is good reason for establishing a strong disincentive to the idea "I'll do my separate bit and will keep my separate share, thank you." But in moral matters individual action and inaction are the crux. So here, where *individual effort* is paramount, it is advantageous to maximize personal incentives. With individual responsibility credit must be treated on a strictly personal, individualized basis.

**3. With moral credit intention is paramount but with epistemic credit intention is immaterial since results are paramount.**

With moral credit/discredit intentions counts: from the moral point of view, intent is critical. The wicked nephew poisons rich Aunt Agatha's tea. In the last moment the clumsy chambermaid knocks it over, and a fresh, harmless cup of tea is produced in its place. Legally the nephew is, of course, guiltless, but morally he is guilty as sin. The drowning child cries for help. You plunge into the raging waters to save him. When you are on the verge of taking hold of the infant, a great wave comes along and sweeps you both onto the shore. Your brave and selfless actions had no effect. But from the moral point of view you are still a hero. From the angle of moral appraisal outcome is generally subordinate to intent.

But with epistemic credit the matter stands otherwise. Here accomplishment is all and intent stands irrelevantly on the sidelines. And the rationale is again straightforward. In the moral case, where what matters is canalizing the smooth interaction of individuals in the promotion of the common interest, we put paramount emphasis on process and therefore on motivation with respect to goals and intention. In the epistemic case where product is paramount; where purely epistemic credit is concerned, we do not care about intention; here product is pivotal.

**4. With moral credit inadvertence is credit-annihilative but with epistemic credit serendipity counts**

Doing the right thing unwittingly and by accident, gains you little if any moral credit, though as far

as moral blame goes, this sort of thing helps to serve as exculpation. But things stand otherwise with epistemic credit. Accidental discoveries are still discoveries and deserve full marks as such.

Again, the difference clearly lies in the fact that with moral credit motivation and hence process is paramount, while with epistemic credit product is paramount. The different aims of the two enterprises are once more determinative.

Three paramount lessons emerge from such comparisons:

- Epistemology and morality are both normative enterprises, but they differ sharply in point of teleology. Their functional or purposive dimension is very different.
- In consequence of this, epistemic credit and moral credit work on very different principles.
- This difference of principles rests on the fact that a very different rationale is operative with respect to credit allocation in these two cases. Moral credit pivots on process and intention; epistemic credit on product and accomplishments.

There is, moreover, another significant point of difference between the moral and the epistemic situation. In the case of collaborative discovery only a fixed amount of credit is available—namely the value of the discovery at issue—and the participants share it altogether. But in the case of moral right- or wrong-doing, in specific, there is no fixed amount of discredit to be shared by the group as a whole. All the individuals concerned stand on their own footing, and each culprit, severally and individually, becomes saddled with the whole of the reprehension at issue. Thus if two miscreants join in deceiving or mistreating someone, each deserves blame for the whole of the misdeed: they do not divide it between them, nor would they each get half as much if there were twice as many. And the same holds for morally creditable actions as well.

In this sense, most credit and discredit is in fact reduplicative. Consider wrongdoing. With collaborative theft or murder each participant is a thief or murderer—from the moral standpoint at least. And for good reason. The policy at issue is designed to serve as a maximally effective deterrent. Collective misdeeds redound upon all



alike in the case of moral transgression even as collective achievements redound upon all alike in cases of collaborative discovery. In the latter case we seek to maximize the incentives for action that is appropriate and in the former to maximize the incentives against action that is inappropriate.

## 8. The Reason Why

It is clear that in general markedly different policies and procedures are at issue with epistemic and moral credit. But why should this be?

The answer here lies in the fact that very different aims are at issue in the moral and the epistemic enterprises. With inquiry we want results: our epistemic concerns are result oriented—we want to advance the frontiers of knowledge. Product is paramount. Epistemic credit is achievement driven: the value of the findings that result is the decisive consideration. With morality, by contrast, we want good procedure: our moral concerns are process oriented—we want people to comport themselves properly and trust results to take care of themselves. Pragmatically or functionally different enterprises are at issue. Moral credit is process driven, so that here what people endeavor to do is the key factor.

Some significant lessons emerge from such comparisons: Epistemology and morality are both normative enterprises, but they differ sharply in point of teleology. Their functional or purposive dimension are markedly different, so that a very different rationale is operative with respect to credit allocation in these two cases. Moral credit pivots on process and intention; epistemic credit on product and accomplishments. And in consequence there arises a difference in distribution principle owing to the greater functional adequacy in point of effectiveness and efficiency in goal realization that these different principles are able to engender.

This goal-oriented perspective accordingly brings to light the rationales for the allocation process at issue. Seen as a functional enterprise, the aim of morality lies in inculcating actions benefit of the wider safeguard the real interest of people through serving the best interest of the community. Morality thus seeks to canalize and direct the actions of all the people concerned

through guiding and goading them into doing what is right by way of assuring the general interest of the group to the advantage of all concerned. Accordingly, the mission of the moral project is to promulgate and instill in people those modes of action that coincide to the general advantage through protecting the interests of people-in-general in contexts of interaction. Morality spells out the rules—the do's and (primarily) don'ts heed of which will facilitate the shaping of a community where people are not inappropriately disadvantaged through the agency of others. The crux is that process (what people do) is paramount for morality, with the issue of outcome (how things work out) as subsidiary and incidental since it lies largely outside the agent's control. In allocating moral credit and blame, praise or reprehension, intention thus become the pivotal factors—exactly as Kant emphasized long ago.

Of course the moral ideal is good results that issue from good intentions. But under sub-ideal conditions the principles for allocating moral credit or blame prioritize intent and outcome is left to take care of itself. Morality accordingly prioritizes effort as comparatively manageable and under our control. (By contrast, outcome is hard and all too often lies beyond our powers.) Situations vary and outcomes are contingent and often lie outside the agent's effective control. People propose and the reality's course of events disposes. And it does so in all too often uncontrollable ways: outcome generally lies *extra vires*, beyond our power, but intention and effort—with its emphasis on what we are *trying* to do—lies within the agent's control. Getting people to *try* to do the proper thing will generally optimize the chances of success. In sum, realizing the definitive goal of the moral enterprise is something that is better served by a policy that prioritizes intention and effort over outcome and performance.

By comparison, inquiry too is a functional enterprise. But it has a very different sort of goal-structure—one that prioritizes the achievement of knowledge. For the discomfort of unknowing is a natural component of human sensibility. To be ignorant of what goes on about us is almost physically painful for us — no doubt because it is so dangerous from an evolutionary point of view.

It is a situational imperative for us humans to acquire information about the world. The requirement for information, for cognitive orientation within our environment, is as pressing a human need as that for food itself. The basic human urge to understand—to make sense of things—is an integral and characteristic aspect of our make-up — we cannot live a satisfying life in an environment we do not understand. For us intelligent creatures, cognitive orientation is itself a practical need: cognitive disorientation is physically stressful and distressing. And inquiry—the means by which we endeavor to satisfy this need—is accordingly product driven. The advancement of knowledge is the paramount task for the enterprise of inquiry. Here intent is irrelevant and achievement determinative.

## 9. A Look at the Law

With the allocation of legal responsibility and culpability, we again come up against the fact that this enterprise has its own characteristic sort of goal structure. A comparison helps to illustrate this. Moral assessment pivots on what can reasonably be anticipated. People who drive their cars home from an office party in a thoroughly intoxicated condition, indifferent to the danger to themselves and heedless of the risks they are creating for others, are equally guilty in the eyes of *morality* (in contrast to *legality*) whether they kill someone along the way or not. Their transgression lies in the very fact of their playing Russian roulette with the lives of others. Whether they actually kill someone or not is simply a matter of chance, of accident and sheer statistical haphazard, of circumstances beyond their control, and therefore the moral negativity is much the same one way or the other — even as the moral positivity is much the same one way or the other for the person who bravely plunges into the water in an attempt to save a drowning child as the tide is drawing him out. Allocations of moral responsibility prioritize intentions. But legal responsibility works very differently. For allocations of legal responsibility prioritize outcome. If a drunk driver is lucky and does not kill someone his legal offense goes no further than driving drunk.

How is this difference between the moral and the legal situation to be accounted for? Very

simply in functional terms. The difference roots in the difference of the different teleology—the different aims and purposes—of the enterprises concerned. For the project of morality and the project of legality each has its own characteristic mission. And it is this functional, purposive, pragmatic difference that explains the difference in credit allocation.

## 10. The Primacy of Pragmatism

Against this background, it is not hard to see that the different allocation processes at issue with moral and epistemic credit inhere in a fundamentally *pragmatic* rationale. For it emerges that this difference in comportment can be explained on the basis of the efficiency and effectiveness of those different credit allocation rules in facilitating realization of the definitive goals of these two distinct enterprises.

And it is just here that methodological pragmatism comes into it. For such a pragmatism is a doctrine based on the idea that the rational legitimization of a practice or procedure or instrumentality lies in its effectiveness and efficiency at realizing the goals and purposes of the domain in which this practice or procedure or instrumentality has been instituted. And just this accomplishes the work that is needed in the present case.

This sort of approach clearly serves elsewhere as well. For example, we see it at work once more in the difference of *modus operandi* as between moral and legal culpability. Suppose X, Y, and Z collaborate on an armed bank robbery. X enters the premisses and does the stick-up work, Y acts as lookout, and Z drives the get-away car. The bank guard resists and X shoots him dead. From the moral point of view, X alone is a murderer—the moral culpability belongs to the agent. But from the legal point of view all are guilty of murder. And the rationale for this difference of course lies in the paramount goal of the legal enterprise in relation to preserving the fabric of the social order that enables people-in-general to go about their affairs safe and secure in matters of life, limb, and property.

In the end, then, it is *the pragmatics regarding the functional teleology of the enterprise* that both explains and validates those relevant principles of

operation. Inquiry, morality, law, etc. represent particular sorts of human projects, each of which is characterized by a distinctive goal structure of ends, aims, and objectives of its own. And the cardinal rule of pragmatic rationality is the same throughout: "Proceed in a manner that is optimally efficient and effective in realizing the purposes at hand."<sup>10</sup> It is exactly this purposive dimension of the enterprise in which the *modus operandi* of its

rules for allocating credit and/or reprehension will ultimately be rooted via considerations of effectiveness and efficiency in goal-realization. In this regard it is noteworthy and significant that a pragmatic, purpose-oriented approach can prove to be not only useful but necessary for understanding the ways of even those "higher" values at issue in the allocation of epistemic and moral credit.

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## Notes

- 1 For an interesting examination of connected issues see Marion Biagioli and Peter Galison (eds.) *Scientific Authorship* (London: Routledge, 2003). The deliberations of this volume though relevant to our present concerns, are differently oriented. For one thing they deal with authorship rather than credit. And for another they address factual issues regarding how authorship works and not normative issues of how credit should be allocated or partitioned.
- 2 On these issues see Stephen M. Stigler, *Statistics on the Table: The History of Statistical Concepts and Methods* (Cambridge MA: Harvard University Press, 1998).
- 3 On this whole episode see the article by L. K. Altman M.D. in *The New York Times*, Tuesday, March 7, 2000, pages D7 and D10.
- 4 The history of inquiry—in science and elsewhere—is, of course, a mixture of progress and error, of finding and mis-finding, of getting information and mis-information. And we have no alternative here to seeing "discovery" as a matter of discovery *facts*, taking this to mean the facts as we see them from the standpoint of the present state of the field.
- 5 Clause (3) leads to complications here. For a mis-finding may well pave the way to an important finding, as, for example, Priestly's phlogiston led to Lavoisier's oxygen. That erroneous "discovery" may very well pave the way to an important discovery. It too is thus important—albeit only of historical rather than substantive importance. Thus if "merely historical" importance is to be excluded, then clause (3) would have to be qualified with respect to the truth-claims of the "finding" at issue.
- 6 An informative treatment of cooperation in general, without, however, any specific reference to inquiry or research, in Raimo Tuomela, *Cooperation* (Dordrecht: Kluwer, 2000).
- 7 "The central characteristic of a tenancy in common is simply that such tenant is deemed to own by himself, with most of the attributes of independent ownership, a physically individual part of the entire parcel." (Thomas F. Bergin and Paul G. Haskell, *Preface to Estates in Land and Future Interests*, 2nd ed., *University Textbook Series* (Foundation Press, 1991), p. 54
- 8 With papers publishing research produced under conditions of multilateral *distributive* cooperation it makes sense to list the names of the contributors in order of decreasing shares. With those produced under conditions of multilateral *collective* cooperation an alphabetical or anti-alphabetical order should ideally be used standardly and systematically to synchronize the character of the inquiry.
- 9 Of course even within the setting of teamwork there are often subordinate inquires that can be factored out into subordinate components for distributive pursuit. And some team members will generally deserve special credit on this basis. Thus one can often say that certain core contributions were due to one particular team member, which others then developed and refined in interactive fashion.
- 10 What we have here is not an act-pragmatism ("Take that course of action which is optimally efficient and effective. . .") because in the contingency of affairs individual outcomes are

inherently less predictable than statistical tendencies. Observe that the situation is structurally much the same here as that in ethics in the case of act-utilitarianism vs. rule-utilitarianism.

Nicholas Rescher is University Professor of Philosophy at the University of Pittsburgh where he served for many years as Director of the Center for Philosophy of Science. He is a former president of the Eastern Division of the American Philosophical Association, has served as President of the American Catholic Philosophical Association, the American Metaphysical Society, the American G. W. Leibniz Society, and the C. S. Peirce Society. Author of some one hundred books covering the central branches of philosophy, Rescher is also a founding editor of the *American Philosophical Quarterly*, *History of Philosophy Quarterly*, *Public Affairs Quarterly* and *The Journal of Philosophical Logic*. His recent publications in epistemology include *Realism and Pragmatic Epistemology* (2005); *Cognitive Harmony* (2005); *Common Sense: A New Look at an Old Tradition* (2005); *Epistemic Logic* (2004); *Epistemology: On the Scope and Limits of Knowledge* (2003); *Cognitive Idealization: On the Nature and Utility of Cognitive Ideals* (2003); and *Satisfying Reason: Studies in the Theory of Knowledge* (1995).