Chapter 2
Saving the Moral Phenomena

Abstract Chapter 2 focuses on morally phenomenal statements such as 'That was generous' and 'He is unfair'. Disagreements over such statements are rooted in the vagueness of terms like 'generous' and 'unfair', which makes the use of these terms to classify actions and people problematic. This chapter introduces core classification as the fundamental form of classification, linguistic or not. To develop the concept of core classification, the chapter proposes the analogy thesis: positive core classification is by analogy; negative core classification is by disanalogy. This is a descriptive claim, but there is an attendant normative thesis: good core classifications result from good analogies. When is an analogy good? The chapter proposes that arguments by analogy can be evaluated by appeal to a standard of inductive cogency. Like the standard of deductive soundness, inductive cogency imposes a condition on the argument's content and a condition on its form. The formal condition is that the form be inductively strong, where inductive strength can be defined by quantitative inductive logics in the tradition of Carnap, Hintikka, Kuipers, and Niiniluoto. The chapter claims that recourse to inductive cogency affords an in-principle solution to morally phenomenal disagreements. To illustrate this claim, the chapter addresses the moral dilemma faced by Cicero's grain merchant.

2.1 Inductive Molding

Plato tasked astronomers with saving the phenomena: to account for the observed motions of the planets with hypotheses of uniform circular motion. This chapter undertakes to save the phenomena as well, though the phenomena it treats are linguistic, not astronomical. More specifically, the chapter ponders our linguistic practices of classification. The discussion treats classification in general, but it does so in order to focus on moral classification with predicates proper to the phenomenal stratum of moral discourse. Unproblematic moral classifications (that the torture of a child is cruel, say) and unproblematic nonmoral classifications (such as identifying Secretariat as a horse) are the linguistic counterparts of the observed motions of the planets. They are the phenomena to be saved.

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These phenomena do not exhaust our classificatory experience. The predicate that we apply with aplomb to Secretariat may stump us in the presence of a mule. Predicates that are clearly applicable in some situations are doubtfully applicable in others. For predicates, as we know, are vague. Vagueness is so ubiquitous that Peirce claimed "*No* concept, not even those of mathematics, is absolutely precise; and some of the most important for everyday use are extremely vague" ([c. 1906] 1931–1958, 6.496; emphasis in original).

Just what vagueness is has been strenuously debated.[1] Vagueness is epistemic, according to some (Sorensen 1988; Williamson 1994). Objects have clear boundaries, and vague language reveals ignorance of these boundaries. Vagueness is ontological, according to others (Tye 1990). Objects like Mount Everest are inherently fuzzy, and vague language reflects the underlying fuzz.

This chapter deploys what I take to be a compromise position. It discusses the central case of vague predicates, though adjectives, adverbs, quantifiers, definite descriptions, and proper names may also exhibit vagueness. Predicates are coined in specific contexts for specific purposes, but these limited practices do not automatically fix the extensions of predicates over the domain of all objects. The linguistic community using the predicate has rarely considered, much less decided, all questions that might arise about the predicate's extension. To this extent, then, I take the ontological view to be correct: there may be no fact of the matter of whether a man with 229 hairs on his head is bald. But this is not the end of the matter. A predicate that clearly applies in some contexts can be reasonably extended to others where it is initially vague. This process of development approximates the cognitive remedy for vagueness that the epistemic view prescribes. Provided the line of development runs from clear to problematic cases, it is comparable to a hypothesis that saves the phenomena.

This developmental process appears to be what G. H. von Wright was groping for in his reflections on molding concepts (1963, p. vii, 5, 138, 171). The urge to undertake conceptual investigation is one of the main reasons for doing philosophy, he claimed. This urge arises from bewilderment about the meaning of words. But this is not the type of bewilderment produced by unfamiliar terms. It arises in connection with familiar terms when the grounds for their appropriate use are incompletely known. The aim of this type of conceptual investigation

> is not to "uncover" the existing meaning (or aspect of meaning) of some word or expression, veiled as it were behind the bewildering complexities of common usage. The idea of the philosopher as a searcher of meanings should not be coupled with an idea or postulate that the searched entities actually *are there*—awaiting the vision of the philosopher. If this picture of the philosopher's pursuit were accurate, then a conceptual investigation would, for all I can see, be an *empirical* inquiry into the actual use of language or the meaning of expressions.
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> Philosophical reflexion on the grounds for calling a thing '*x*' is challenged in situations, when the grounds have not been fixed, when there is no settled opinion as to what the grounds are. The concept still remains to be *moulded* and therewith its logical connexions with other concepts to be *established*. The words and expressions, the use of which bewilder the philosopher, are so to speak *in search of a meaning*. (1963, p. 5)

[1] This chapter is a revised version of Welch (2007).

In the spirit of these remarks, what I propose in this chapter is a strategy for conceptual investigation. The basic idea is to mold concepts and thereby reduce vagueness through a process of inductive inference. As stated, the emphasis will be on molding moral concepts proper to the phenomenal stratum of moral discourse. That is, "thick" terms such as 'honest' and 'courageous' are notoriously vague, and the chapter proposes a strategy for reducing their vagueness. The argument is modest in that I will not claim that inductive molding can eliminate vagueness. Unfortunately, the law of excluded middle does not always hold. But I will argue that the truth-value gaps associated with these failures need not be permanent, that they can be reduced on a piecemeal basis. The engine of reduction, I claim, is inductive logic.

Vagueness cannot be understood apart from the backdrop of classification, for vagueness is classification gone awry. Hence these pages explore the classification of particulars, both its clear successes and vague failures. How we classify particulars is the theme of the next two sections, which are primarily descriptive. Section 2.2 identifies a way of classifying particulars that pervades discourse of all sorts, and Sect. 2.3 illustrates its use in moral discourse. Why a certain particular should (or should not) be classified in a certain way is a normative question, however, and it occupies the two following sections. Section 2.4 proposes a standard for cogent arguments by analogy, and Sect. 2.5 illustrates how the standard might resolve vagueness in one kind of moral dispute. This standard, which has a strong probabilistic component, is one way of affirming that probability is a guide to life.

2.2 Core Classification

About 150 Yanomama Indians eke out a Stone Age existence deep in the Amazon rain forest, in an isolated village on the border between present-day Venezuela and Brazil. A team of anthropologists and journalists visited the area some years ago, and one of the journalists reported the following encounter.

> The little bull of a man with brushcut hair and only a bark string around his waist was studying our Venezuelan Air Force Super Puma helicopter like a scientist. Once before he had seen something similar, and he drew his arm high across the sky in an arc. "I kept calling him to come down, but no luck." What about the chopper, we asked, what was it? He paused for a moment, then tentatively offered: "It's an animal, a *hashimo*"—a smooth-feathered green grouse—and by way of explanation waved his arms and made the thrashing sound of a big bird exploding from the underbrush. What kept it here? "It's a pet." Did he want to go for a ride? "Maybe later. A long time from now. A really long time." (Reiss 1990, p. 46)

Of the several remarkable features of this encounter, I would like to focus on just one: Yokokoma's classification of the helicopter as a *hashimo*. How did he manage to do that? And how do we manage to classify it otherwise?

Suppose we refer to statements like 'That is a *hashimo*' and 'That is a helicopter' as *core classifications*. These rudimentary orderings of the world have the form 'δ is *T*', where 'δ' stands for a demonstrative pronoun or a proper name and '*T*' for a class

term. The notion of core classification is ample enough to include a perception that something is wet, for instance, since the perception can be expressed in the form 'δ is *T*'.[2] Proficiency in core classification is essential for getting around in the world, for survival requires reliable identifications of food, danger, and potential mates. How we core classify is therefore a question of cardinal importance.

Though the question can be addressed from many points of view, the biggest part of the answer can be put in the fewest words. Positive core classification is by analogy. The astronomer identifies a quasar, the camper a lichen, the musician a half-tone by perceiving the similarities between a unique object and previously cognized quasars, lichens, and half-tones. In all these cases, there are the known old, the unknown new, and the assimilation of the latter to the former through the relation of similarity. This assimilation is all but transparent in ordinary English expressions such as 'This looks like a mantis' and 'That smells like fire'. Negative core classification, on the other hand, is by disanalogy. The numismatist's judgment that this is not gold arises from the known old, the unknown new, and the perceived dissimilarity between the two. Hence I propose the following thesis: positive core classification is by analogy; negative core classification is by disanalogy. Call this the *analogy thesis* for short.

The analogy thesis as just formulated needs at least two qualifications, however. The first is to recognize that core classification may occur with abstract as well as concrete terms. Take the core classification 'This is an animal', for instance. Its epistemic base might well be a concrete core classification that this is a paramecium and a linguistic truth that all paramecia are animals. If this is so, however, the concrete classification would be carried out by analogy. Hence 'This is an animal' would be grounded mediately by analogy, not immediately as in concrete classifications. To cover the abstract case, I will claim that positive core classification is ultimately by analogy; negative core classification is ultimately by disanalogy.

A second qualification is needed for a relatively infrequent but key occurrence of core classification that is not analogical. When someone inaugurates a class term, there is no identification of the new by analogy with the old for the simple reason that there is no old. In the case of a newly-identified species, for example, there may be analogies between the first known individual of that species and members of neighboring species, but there can be no analogy within the species while only one exemplar is known. Call these seminal classifications *coinages*. The analogy thesis can then be restated: Except for coinages, positive core classification is ultimately by analogy; negative core classification is ultimately by disanalogy.

For all its brevity, the analogy thesis covers a lot of territory. A full appreciation of this point requires three considerations. The first is a reprise of the prior observation that core classification can be linguistic, as in 'That is a hake', or nonlinguistic,

[2] Perceptions can be interpreted as nonlinguistic beliefs. This opens up lines of inquiry into the controversial arena of animal belief. Plato and Aristotle split on the matter, as Richard Sorabji (1993) interprets them, with Plato attributing beliefs to animals and Aristotle not. In contemporary philosophy, Jeffrey (1985) is Platonic on this point while Davidson (1982) is Aristotelian. Here I side with Jeffrey.

as in a perception that Dana is tall. The analogy thesis embraces both types of core classification. The second consideration is that, despite the nature of the foregoing examples, the thesis is not limited to physical objects. Its scope is actually the class of events. This has immediate implications for physical objects, however, for each can be understood as an event that unfolds as long as the object exists. Finally, the analogy thesis applies to actions as well, for actions are purposed events.

2.3 Core Classification in Ethics

The preceding is all quite general; it makes no reference to specific domains of discourse. From here we could branch off into any domain at all. However, what I propose to explore is moral discourse of a specific kind. Morally phenomenal discourse is typified by concepts such as 'just', 'cruel', 'temperate', 'cowardly', 'honest', 'untrustworthy', 'loyal', 'unfair', 'compassionate', and their complements. Loci for the sort of thing I have in mind are the early Platonic dialogues, which can be mined for insights on core classification in ethics: courage in the *Laches*, justice in *Republic*, Book I, temperance in the *Charmides*, and so forth.

Had the search for definitions in the early dialogues been successful, or had the definitions in *Republic*, Book IV, been more than rough-cut, stopgap measures, or had there been breakthroughs in the definition of ethical terms between Plato's time and our own, we could understand ethical core classification as follows. Imagine that we have an accurate definition of justice. It tells us that an action is just if, and only if, it is *F* and *G* and *H*. We could then classify individual actions by using our definition as a criterion: since this action is *F* and *G* and *H*, it is just; and that action, because it is *F* and *G* but not *H*, is not just.

2.3.1 Prototype Theory

There is ample reason by now to think that this definitional approach is barking up the wrong tree. An extensive, multidisciplinary literature points toward a very different understanding of human classification (Lakoff 1987, Chap. 2). Though I will not survey this literature here, I will note that Wittgenstein's remarks on family resemblance (1953, § 65–78) are a point of departure for much later work in the field. And I will acknowledge the special importance of empirical work by Eleanor Rosch and her associates in cognitive psychology.[3]

Rosch is responsible for drawing together a number of separate empirical studies under the rubric of prototype theory. Part of the interest of prototype theory lies in its direct opposition to the classical conception of classification presupposed by

[3] Rosch (1973, 1978, 1983), Rosch and Mervis (1975), Rosch et al. (1976). Rosch (1978) is conveniently reprinted in Margolis and Laurence (1999, pp. 189–206) along with several papers that aim to supplement or replace prototype theory.

Plato and passed on to scores of generations of Western scholars. According to this classical view, class membership is determined by necessary and sufficient conditions, and accurate definitions state these conditions. If this were the case, however, there would be no best examples of a kind; any member of the class would serve equally well, for all would satisfy the same set of conditions. That there are best examples of a kind—prototypes—is a crucial result of Rosch's work. Speakers of American English, for example, consistently rate robins as better examples of bird than ostriches or penguins, and desk chairs as better examples of chair than beanbag chairs or electric chairs (Rosch et al. 1976). Class membership, so understood, is not an either-or affair; it is a matter of degree.

Even the classes recognized by the physical sciences seem to have prototypes. In discussing the theoretical identities 'Water is H_2O' and 'Temperature is mean kinetic energy', Hilary Putnam remarks that "the 'essence' that physics discovers is better thought of as a sort of *paradigm* that other applications of the concept ('water', or 'temperature') must *resemble* than as a necessary and sufficient condition good in all possible worlds" (1983, p. 64).

Moral classes also show prototype effects. We have no problem identifying Socrates' saving of Alcibiades' life as courageous, but how do we classify the suicide of Seneca's barbarian, who asphyxiated himself with the sponge he was given for wiping himself before his scheduled appearance in the circus to fight wild beasts? Even if we concur with Seneca's classification of it as courageous ([63–65] 1920, LXX.20–21, pp. 66–69), it is not obviously so. This graded sort of membership in moral classes is due in part to moral education, which in its early stages proceeds through introducing prototypically moral and immoral actions in fairy tales and other narratives. But it is also an effect of what happens next. Once we have learned to manage a handful of moral predicates in prototypical situations, we begin to extend these terms to new situations by analogy.

2.3.2 Washington's Cherry Tree

I want to consider one example of this process in some detail. The example is trivial, in a sense, but that is precisely its point. It is a prototype, the kind of action that serves as a moral reference point for a community—primarily, in this case, that of the United States. Despite the limitations of the example, comparable prototypes for other cultures would not be hard to find. Prototypes are culturally embedded, and the profusion of human life forms practically guarantees variety of prototypes.

The source for this sample prototype is Mason Weems' classic biography of the American President George Washington ([1809] 1962).[4] Weems was an Episcopal clergyman and bookseller who, a month after Washington's death in 1799, wrote to a business associate to propose a biography of Washington. His plan was to

[4] The incident appears for the first time in the fifth edition of 1806. The citations from Weems ([1809] 1962) are from the ninth edition of 1809.

demonstrate that Washington's "unparrelled [*sic*] rise & elevation were due to his Great Virtues" ([1809] 1962, p. xv). One of the virtues Weems attributed to Washington was honesty. To illustrate the point, he recounted the following incident:

> When George… was about six years old, he was made the wealthy master of a *hatchet*! of which, like most little boys, he was immoderately fond, and was constantly going about chopping every thing that came in his way. One day, in the garden, where he often amused himself hacking his mother's pea-sticks, he unluckily tried the edge of his hatchet on the body of a beautiful young English cherry-tree, which he barked so terribly, that I don't believe the tree ever got the better of it. The next morning the old gentleman finding out what had befallen his tree, which, by the by, was a great favourite, came into the house, and with much warmth asked for the mischievous author, declaring at the same time, that he would not have taken five guineas for his tree. Nobody could tell him any thing about it. Presently George and his hatchet made their appearance. *George*, said his father, *do you know who killed that beautiful little cherry-tree yonder in the garden?* This was a *tough question*; and George staggered under it for a moment; but quickly recovered himself: and looking at his father, with the sweet face of youth brightened with the inexpressible charm of all-conquering truth, he bravely cried out, "*I can't tell a lie, Pa; you know I can't tell a lie. I did cut it with my hatchet*." ([1809] 1962, p. 12; Weems' emphasis)

The first point to be made about this story is that even though Weems attributes it to "an aged lady, who was a distant relative [of Washington], and when a girl spent much of her time in the family," historians almost universally reject it as apocryphal ([1809] 1962, p. 9, xxiv–xxxiv). The second point is the mordant one that Weems succeeded, apparently through falsehood, in placing what he took to be Washington's honesty before the "admiring eyes" of many children. By the time of Weems' death in 1825, twenty-nine editions of his *Life* had appeared; by 1925, the number had grown to eighty ([1809] 1962, p. xx). Abraham Lincoln read it in "the earliest days of my being able to read," but so did many others ([1809] 1962, p. xxii). The story of the cherry tree in particular reached millions through being excerpted in a vast body of Sunday-school books and textbooks, notably McGuffey's *Readers*, 120 million of which were published in the United States between 1836 and 1920 ([1809] 1962, pp. xx–xxiii, xlvi–xlviii; Ong 1982, pp. 115–116). Given such a central place in moral education, there is little doubt that the incident has served as a base for Americans' understanding of honesty.[5] Almost in spite of itself, then, the incident became a moral prototype.

To see how such a prototype might be used in moral reasoning, let us return to Weems' account. From it we can extract an abstract description of the situation that includes the following features:

1. *g* is the child of *f*;
2. *g* believes that *p*;
3. *g* has a selfish desire that *f* not come to believe that *p*;
4. *f* asks *g* whether *p* is true;
5. *g* conveys to *f* that *p* is true.

[5] To avoid confusion over the kind of honesty that has to do with property, we might prefer the term 'truthfulness' here. I use 'honesty' to connect up with the case of the grain merchant below.

The result is a kind of template that is plainly applicable to other cases.

Let us consider a few. Incorrigible George next cuts down his father's pear tree, responding as before to his father's question. Because this recidivist action is identical to the prototype in the ways picked out by the template, the present action is honest as well. Now take an action that is like the preceding except that feature 1 of the template is absent: *f* and *g* are not related as parent to child. Despite the difference, the strong similarity between the prototype and this case would naturally lead us to classify the action as honest. A third case is like the second except that feature 3 of the template is missing as well (*g* is indifferent whether *f* comes to believe *p* or not, say). While the similarities between this case and the prototype make it easy enough to call the former honest, the exemplary honesty exploited by Weems has been lost.

Our reactions to these increasingly divergent cases suggest that, as a matter of fact, moral predicates are applied to novel actions or not on the basis of perceived similarities and dissimilarities between the actions and prototypes. This is most easily confirmed for predicates linked with "thick" concepts like honesty, brutality, and courage (Williams 1985, p. 129 f.). However, I submit that "thin" concepts such as the right and the good are tied to concepts like honesty via meaning postulates such as 'Honesty is *pro tanto* right'. That is, thin core classifications like 'This action is right' are epistemically grounded in thick core classifications such as 'This action is honest', and these thick classifications are carried out via analogy. If this is so, then ethical core classification proceeds ultimately by analogy and disanalogy, and the analogy thesis holds for moral discourse in particular.[6]

Observe that the analogies contemplated here are entirely factual. Moral properties picked out by thick core classifications supervene on factual properties such as instantiations of features 1–5. This standpoint should be compatible with an ample range of meta-ethical positions. It intersects with moral cognitivism of the sort defended by Alan H. Goldman, who thinks "Moral reasoning must begin with nonnormative descriptions of actions or situations and terminate in moral prescriptions" (2002, p. 13). It is also consistent with moral hybridism: the view that moral theories express both desires and beliefs (e.g., Schroeder 2009), for the beliefs can reflect factual properties that instantiate features 1–5. It should even be acceptable to some forms of moral noncognitivism. In developing a well-known form of moral subjectivism, J. L. Mackie concedes that whether an action is cruel or kind or just is an objective matter (1977, pp. 16–17, 25–27, 41). What is not objective, he thinks, is that we should be kind and just but not cruel.

A possible response to this sort of moral subjectivism is to shift our ground. We might try moving from factual analogy to mixed analogy with both descriptive and evaluative properties. Say, for example, that the Weemsian prototype has descriptive properties instantiating features 1–5 plus the evaluative property of being morally obligatory. Say that another action has the same descriptive properties. We

[6] Albert R. Jonsen and Stephen Toulmin's defense of particularism deploys a similar thesis on moral paradigms and analogy (1988, pp. 85–86, 251–252, 330). Although Alan H. Goldman rejects particularism, he makes a parallel case for moral and legal reasoning (2002, p. 2, 15, 161, 166, 168–169).

might then draw the analogical inference that the second action is morally obligatory. I submit that this inference is a good model for the psychology of many ethical analogies; we do often reason like that. But I do not believe it is the best way to justify these inferences. The reason is that mixed analogies simply assume the moral obligatoriness of the prototypical action. That the prototypical action is morally obligatory can often be shown, I believe, but not within the phenomenal stratum. Doing so requires ascent to instrumental and teleological strata. Sections 4.4–4.5 and 5.4–5.5 treat the matter directly.

2.4 A Standard for Analogy

The analogy thesis brings epistemological problems in its train. Suppose that perceptual analogies clash; one person perceives a color as mauve, say, while another perceives that it is not. Stating the conflicting analogies offers a way out by opening the analogies up to intersubjective criticism. But that is to lean on a slender and suspect base: the much-maligned argument by analogy.

Imagine some ancient sailor with a prototype of a fish in mind.[7] The sailor knows that that aquatic animal—a shark, perhaps—is a fish. Then it would be perfectly natural to reason by analogy that since this whale is an aquatic animal, this whale is a fish. Aristotle, on the other hand, thinking of some human being as a prototype of a mammal, would make the analogical inference that since that animal that nourishes its fetus with a placenta is a mammal, and since this whale is an animal that nourishes its fetus with a placenta, this whale is a mammal. Put the sailor and Aristotle together, and the result is what I will call convergent analogy: two chains of analogical inference converging at the same point—in this case, the whale. One chain reasonably identifies it as a fish; the other, just as reasonably, as a mammal.

We also find convergent analogies in ethics. Consider the African slave trade, for instance. One point of view was to justify the slave trade in the language of Aristotle's *Politics*, where the soul is said to govern the body, a human being an animal, a parent a child, all according to the natural dominance of inferior by superior (*Politics* 1254a18–1255a2, 1259b18–1260b26). Referring to one of these prototypes, a defender of the slave trade could reason as Aristotle himself would have: since that case of superior governing inferior is just, and since the treatment of Africans in the New World is a case of superior governing inferior, the treatment of Africans is just. On the other hand, the ancient ideology of slavery assimilated liberty to property: just as selling one's property need not violate justice, neither does selling one's liberty (Blackburn 1997, pp. 177–180). Accordingly, Bartolomé de Las Casas proposed in 1516 that justly enslaved Africans replace unjustly enslaved native Americans in the New World. But he was soon forced to change his mind. He saw that since native American enslavement was unjust and the conditions of African enslavement were comparable to those of native American enslavement, African

[7] The remainder of this section draws on Welch (1994, pp. 284–285).

enslavement was unjust as well (Las Casas [1561] 1994, iii.102, p. 2191; iii.129, p. 2324). Once again, then, we have analogical chains of inference converging at the same point. One says that the African slave trade is just, the other that it is unjust.

The clash of reasoned opinion that comes from the convergence of analogical chains can be transmitted almost spontaneously up the epistemological ladder. Having concluded through repeated analogies that a number of *F* are *G*, we could leap to the inductive conclusion that all *F* are *G*, which could serve in turn as a premise in a deductive inference that some as yet unexamined *F* is *G*. At the same time, rival analogical conclusions that various *F* are not *G* could ground the inference that all *F* are not *G* and, as a result, that some unexamined *F* is not *G*. The respective chains of inference just get further and further apart, it seems, the differences more and more unbridgeable. Is there any rational way to bring them together?

There are many ways, actually. Some of them work piecemeal, as the histories of the whale's taxonomy and the antislavery movement show. How long it took the rest of the world to catch up with Las Casas on slavery is as painful to contemplate as the lag in catching up with Aristotle on the whale. Yet catch up it did. But there is another approach that is at once more sweeping, more promising, and more problematic than any of these specific approaches. It is to seek general principles that would permit us to differentiate good and bad arguments by analogy. The remainder of this section attempts to specify what these principles might be.

2.4.1 Inductive Cogency

J. S. Mill once remarked that "There is no word… which is used more loosely, or in a greater variety of senses, than Analogy" ([1872] 1973–1974, III.20.1, p. 554). So let us rehearse some distinctions among kinds of analogy. Although the following typology refers exclusively to linguistic analogy, it should be kept in mind that nonlinguistic, perceptual analogies can be described *as if* they were linguistic. That is, a perceived analogy between two things can be described as if an analogical claim about them was being made.

One place to begin a typology of analogy is with the conspicuous divide between *general analogies*, analogies with at least one quantified sentence, and *singular analogies*, composed entirely of unquantified sentences. The latter, which are indispensable to core classification, can be subdivided into perfect and imperfect forms. In *perfect analogies* the relata are thought to share all relevant properties. A standard example is the traditional argument by analogy:

A_1:

$Fa \wedge Ga$.
Fb.
Hence Gb.

In *imperfect analogies*, on the other hand, the relata are thought to share some but not all relevant properties. Here is a simple example (Pietarinen 1972, pp. 68–69):

A_2:

$Fa \wedge Ga$.
$-Fb$.
Hence Gb.

A_2 makes the imperfectly analogical claim that *a* and *b* share the property *G* but not the property *F*. Though the perfect-imperfect distinction is just the beginning of a typology of singular analogy, we need pursue the matter no further here.[8]

Instead, let us turn to the crucial normative question: What is the difference between good and bad analogies? To sketch an answer, suppose we pull out the old critical saw about sound argumentation. A deductively sound argument must meet at least two necessary conditions. A condition on the argument's content requires all of its premises to be true. And a condition on the argument's form requires it to be valid in the sense that it is impossible that its conclusion is false when its premises are true. Arguments that are deductively sound are logically demonstrative.

Arguments that are inductively cogent are logically nondemonstrative. We can specify necessary conditions for inductive cogency by adapting the pattern of deductive soundness. The content condition remains the same: all the argument's premises must be true. But the formal condition is different; it must be weaker than deductive validity yet still demanding. Here the usual requirement is inductive strength, which stipulates that it be improbable that the argument's conclusion is false when its premises are true (Skyrms 1986, p. 7). Now it is improbable that the conclusion is false when the premises are true if, and only if, it is probable that the conclusion is true when the premises are true. For an argument to count as inductively strong, then, the conditional probability of its conclusion given the premises must be greater than or equal to that of any rival conclusion based on the same premises.

Hence the proposed standard of inductive cogency amounts to this: An argument is inductively cogent only if

a. all the argument's premises are true; and
b. the conditional probability of the argument's conclusion given its premises is greater than or equal to that of any rival conclusion based on the same premises.

Before relating these inductive conditions to arguments by analogy, let us note how neatly they dovetail with our deductive practice. The condition on deductive content is exactly the same, as we have noted. The condition on deductive form, the requirement that the argument be structured such that if the premises are true, then the conclusion must be true, actually implies the inductive condition on form. That is, if an argument is deductively valid, then it is also inductively strong, for its conclusion has a greater probability on the premises (probability 1) than any rival conclusion based on the same premises (probability 0). The condition on deductive form is thus a special case of the inductive condition on form.[9] This was Wittgenstein's point in

[8] A detailed typology of singular analogies can be found in Welch (1999, pp. 209–213).

[9] The inductive condition on form is in turn a special case of the plausibilistic condition on form: the plausibility of the argument's conclusion given its premises must be greater than or equal to

the *Tractatus*: "The certainty of logical inference is a limiting case of probability" (1922, 5.152; cf. Haack 1978, p. 17).

2.4.2 Analogy as Induction

Now let us link the foregoing to analogy. No argument by analogy is deductively sound, but they are not all equally unsound. To distinguish the better from the worse, I propose that we treat argument by analogy as one form of inductive argument. This is a time-honored view. Mill, for instance, remarked that arguments by analogy are "supposed to be of an inductive nature" ([1872] 1973–1974, III.20.1, p. 554), and Carnap handled analogy as induction from at least 1945 on (1945, pp. 87–88). There are a few dissenting voices, however, and they rely on two objections.

One objection has been urged by Stephen Barker, who maintains that while some analogies are inductive, others are not (2003, pp. 225–228).[10] Barker adduces an example of a non-inductive analogical argument involving a student who has passed a bad check and violated his university's honor code:

> Let us consider an example of an argument by analogy which is not inductive. At a certain college the student body has established a rigorous honor code to govern student behavior. The code specifically lists lying and cheating as punishable offenses. The students administer this code and take it seriously. Now suppose it is discovered that a student has written a bad check and used it to purchase merchandise in the town. The question arises whether this student has violated the honor code. Is writing a bad check a violation of the rule against lying and cheating? Let us suppose that those who wrote the code never pronounced on this question and that there are no known precedents about it….
>
> Deductive arguments are not likely to be of much use in this situation. Suppose someone tries to settle the problem deductively by arguing: "All cases of cheating violate the honor code; all cases of writing bad checks are cases of cheating; therefore, all cases of writing bad checks violate the honor code." Although this argument is valid, it does not succeed in proving its conclusion. If we were dubious about whether the conclusion is true, then we are pretty sure to be at least equally dubious about the minor premise. Here the deduction commits the fallacy of begging the question. No purely deductive line of reasoning is likely to settle this problem.
>
> Nor are inductive arguments likely to help much. Whichever conclusion we want to establish—that writing a bad check is, or is not, a violation of the honor code—in either case the conclusion does not embody predictive conjectures about future experience that go beyond what is already known. Reaching a conclusion about whether the student is guilty certainly is not the same as predicting how he is going to be treated. Nor is it the same as predicting what observable consequences his behavior is going to have. Such predictions would be inductive, but they are not what we are seeking. No purely inductive line of reasoning is sufficient here, for the conclusion is not of the inductive sort.
>
> What sort of reasoning would be appropriate to this problem? Someone would be making a helpful and relevant contribution to the discussion who reasoned as follows: "Lying and cheating are indisputably offenses against the honor code. Now, writing a bad check is like falsely stating that you have money in the bank. Also, writing a bad check is very like cheating, for you persuade the merchant to accept the check in exchange for merchandise

---

that of any rival conclusion based on the same premises. Plausibility is introduced in Sect. 3.3.2.4.

[10] John Wisdom, Barker's former teacher, makes a similar point about case-by-case (analogical) reasoning in the law (1969, p. 149, 158).

> by deceptively suggesting that the check is good. Since writing a bad check is so like lying and cheating in these respects, it therefore resembles them also in being a violation of the honor code." At the heart of this reasoning are the analogies between writing a bad check on the one hand and lying and cheating on the other hand. The whole argument essentially depends upon these analogies—the argument is a good argument if and only if these are good analogies.
>
> Unlike deductive reasoning, this sort of reasoning does not claim to be demonstrative. At best, the truth of the premises gives us only some good reason for accepting the conclusion. Also, as we saw, this sort of reasoning differs from induction—the conclusion being argued for does not embody predictive conjectures going beyond what the premises say. (2003, pp. 225–227)

Is Barker's example convincing? I think it is not. The reasons, very briefly, are as follows. The quotation's reference to inductive conclusions embodying "predictive conjectures about future experience that go beyond what is already known" is unduly restrictive, first of all. Why restrict induction to future experience? Barker himself characterizes induction without this restriction in the same work: inductive arguments have conclusions "embodying empirical conjectures about the world that do not follow deductively [from] what its premises say" (2003, p. 181). According to this more general description, empirical conjectures about past experience such as why Caesar crossed the Rubicon would also qualify as inductive. But then why restrict induction to empirical conjectures? Even mathematics employs nondeductive reasoning (Franklin 1987), and such reasoning is inductive in the sense of being nondemonstrative (cf. Carnap 1945, p. 72; Black 1967, p. 169; Skyrms 1986, pp. 6–15; Adams 1998, p. 70; Audi 2004, p. 129).

Second, Barker's analogy between writing bad checks, on the one hand, and lying and cheating, on the other, involves *classes* of actions. But there is no a priori reason to expect all or no bad check passings to be lies or cheats, and every a priori reason to think that some are and some are not. Contrast an intentional and manipulative passing of a bad check with a case where a student writes a bad check in good conscience, relying on her bank's mistaken statement of sufficient funds. The proper focus, then, is whether a *specific action*, this student's passing of this bad check, is a member of the class of lies or cheats.

Third, a respectable argument for Barker's case would therefore be something like the following:

An intentionally deceptive stated message is a lie (Bok 1979, p. 14).

This student's signing this bad check is an intentionally deceptive stated message.

Thus this student's signing this bad check is a lie.

Other arguments might be brought to bear as well, of course, but let us examine this one. The argument is deductively valid, and its empirical fulcrum is the truth of the second premise. Did the student intend to send a deceptive stated message or not? Empirical indicators of intent might well be present: the student's confession, the testimony of anyone party to the plan, a past history of writing bad checks, evidence of the bank's failure to credit a prior deposit to the student's account due to negligence, computer error, a strike, etc. If these indicators are present, they could serve as premises supporting a conclusion about the student's intent. If they are not present, we might still draw a conclusion about the student's intent based on general knowledge of correlations between bad check passing and deceptive intent.

In either case, the reasoning is inductive in nature. I conclude, then, that Barker's purported *sui generis* example can be handled through the use of standard inductive and deductive arguments.

Still, Barker's conclusion might be supported by a second objection. It might be admitted that many analogies are inductive while still maintaining that many are not, for many are abductive rather than inductive. In response, I suggest that we distinguish logical and functional views of argumentation. The logical approach is to classify an argument according to the degree of support the conclusion receives from the premises. But the functional approach keys on how the argument is used. Peirce's trichotomy of deductive, inductive, and abductive arguments is (usually) functional, for instance. Abduction is the first step of scientific reasoning; it advances a hypothesis. Induction is the last step; it uses experiment to verify a deductive consequence of the hypothesis ([1901] 1931–1958, 7.218; [1902a] 1931–1958, 2.96). One Peircean example treats 'This is an ex-priest' first as the conclusion of an abductive argument to explain a surprising conjunction of features and then, after the "experiment" of getting the man to remove his hat to confirm that he is tonsured, as the conclusion of an inductive argument (1902b).

The functional difference between abductive and inductive arguments is large, but the logical difference is small. That this man is an ex-priest follows with some probability from premises describing the initial set of features (Peirce does not name them), and it follows with some greater probability from the initial set plus the premise on tonsure. The difference is one of degree, as Peirce seems to recognize ([1878] 1986, pp. 326–327). Since both conclusions have a conditional probability less than 1, both arguments contrast with demonstrative arguments, whose conclusions have a conditional probability of 1. Both arguments are therefore inductive in the standard logical sense of being nondemonstrative. We can recognize that an argument is functionally abductive, then, and at the same time logically inductive. The foregoing claim that analogy is inductive should be understood in this logical sense.

I suggest that the burden of further proof lies with anyone who wishes to claim that argument by analogy is not inductive. In the meantime, I will appeal to the aforementioned standard for cogent induction. Since argument by analogy is inductive in Barker's sense of nondemonstrative reasoning, a cogent argument by analogy must have all true premises and a conclusion at least as probable on the evidence as any rival conclusion based on the same evidence. Accepting this standard, then, would gain us a principled distinction between good and bad analogies. Applying this standard would weed out poor analogies from the start, preventing them from crowding good seed.

2.4.3 Analogy and Inductive Strength

Let us now attend to the details of this proposal. Arguments by analogy offer difficulties, but no peculiarly analogical difficulties, in determining the truth of their premises. A moral property like honesty supervenes on factual properties, as illustrated in

Sect. 2.3.2. What makes moral properties seem puzzling, I suggest, is that they are disguised relations. When we say that one building is taller than another, we expect the buildings to be visible but not something else called 'taller than'. Similarly, when we say that Washington's response to his father is honest, the actions of father and son would be visible but not something else called 'honest'. The difference is that the explicitly relational surface grammar of 'taller than' naturally draws our attention to the relata, whereas the monadic surface grammar of 'honest' tempts us to search for the corresponding monadic property. There is none. The honesty of an action is a relation among the action's factual properties (cf. Railton 2003).

By contrast with the relative straightforwardness of the truth condition, arguments by analogy do present special difficulties over form. How might we go about applying the condition of inductive strength? Arguments by analogy are built around the relation of similarity, so intuitively it would seem that the relata of inductively strong analogies are somehow more similar than dissimilar, while those of inductively weak analogies are somehow more dissimilar than similar. But putting this intuition to work would require some sort of similarity metric.

To find one, I propose that we consider those logics developed along lines sketched out by Wittgenstein (1922, § 5.15–5.156) and Waismann (1930–1931). Carnap (1952) made the decisive step forward, and his work has served as the basis for later advances by Hintikka (1966), Carnap (1971, 1980), Pietarinen (1972), Hintikka and Niiniluoto (1976), Kuipers (1978, 1984), Niiniluoto (1981), Skyrms (1991, 1993), and Festa (1997), among others. In Carnap's mature work (e.g., 1942, pp. 96–97, 1945, pp. 73–75), the concept of range is a semantic concept explicable as the set of models in which a given sentence (or conjunction of sentences) is true. Suppose we call such models the sentence's *alethic models*.

The relationship between the alethic models of an argument's premises and those of its conclusion shows the probability of the conclusion on the evidence of the premises. There are two types of cases. If the alethic models of the conclusion include all the alethic models of the premises, the conclusion follows from the premises with probability 1, and the argument is deductively valid. On the other hand, if the alethic models of the conclusion do not include all of the alethic models of the premises, the conclusion follows with some probability less than 1, and the argument is not deductively valid. For example, if 3/4 of the premises' alethic models are included in those of the conclusion, the probability of the conclusion given the premises is 3/4.

One result of Carnap's critique of classical probability was his λ-continuum of inductive methods (1952). Given any method of this continuum, the degree of confirmation of a singular hypothesis on the evidence lies within an interval bounded by an empirical factor and a logical factor. The empirical factor is the evidence e_Q, the ratio of the n_Q favorable instances of some strongest property Q to the total number n of instances examined. The logical factor is equal to relative width, which is very roughly the coverage of a property relative to the totality of properties the language admits. Less roughly, for a first-order language with identity recognizing a finite number m of logically independent primitive properties, there are $2^m = K$ strongest properties in the language. Any property that can be picked out in the

language is either a strongest property or equivalent to a disjunction of strongest properties. If the property is a strongest property, its relative width is $1/K$. If the property is not a strongest property, it is equivalent to a disjunction of w strongest properties and its relative width is w/K.

Exactly what point of this interval represents degree of confirmation—or probability, as I shall say—is determined by taking a weighted mean of the empirical and logical factors. Different λ-methods use different logical weights, that is, different specifications of the parameter λ, which can take values from 0 to ∞ inclusive. Now suppose that we have evidence e_Q and that λ can vary with K but not with n_Q and n. Then, for any method of the continuum, the conditional probability p of the hypothesis h_Q that the next individual will have a strongest property Q is given by Eq. 2.1.

$$p(h_Q \mid e_Q) = \frac{n_Q + \frac{\lambda(K)}{K}}{n + \lambda(K)}. \tag{2.1}$$

Equation 2.1 allows for uncountably many λ-methods, but Carnap's favorite was c*, where $\lambda(K)=K$. For consistency with our probabilistic terminology, I will refer to this method as 'p*'. p*'s representative function[11] expresses the probability of the hypothesis h_Q on the evidence e_Q as in Eq. 2.2.

$$p^*(h_Q \mid e_Q) = \frac{n_Q + 1}{n + K}. \tag{2.2}$$

The methods of the λ-continuum are problematic in several ways, but the crucial shortcoming for our purposes is their handling of analogy. For example, where $K=4$, p* assigns the perfect analogy A_1 a probability of 2/3, which seems reasonable enough, while the imperfect analogy A_2 receives a probability of 1/2, which also seems reasonable enough—until we notice that its property analogy has been completely overlooked. That is, since A_2's conclusion 'Gb' has a probability of 1/2, the other possible conclusion, '$-Gb$', receives the same probability. But that is to consider the conjunction of the disanalogous properties FG and $\overline{FG}$ just as likely as that of A_2's analogous properties FG and $\bar{F}G$.

The λ-continuum has been superseded by several systems: Hintikka's α-λ continuum (1966), which extends the λ-continuum to improve the handling of inductive generalization; Carnap's Basic System (1971, 1980), which extends the λ-continuum by including predicates of unequal as well as equal widths; and Hintikka and Niiniluoto's K-dimensional system (1976), which axiomatizes a substantial portion

[11] Representative functions are so-called because they determine all other values within the system. Carnap replaced the term 'characteristic function' of (1952) with 'representative function', and his later usage is followed here.

of the α-λ continuum.[12] But all these systems have the same difficulty with singular analogy (Welch 1999). Various remedies have been proposed.[13] That to be pressed into service here originated with Kuipers (1984) as a counter-proposal to one by Niiniluoto (1980, 1981), who subsequently endorsed it (1988, p. 287).

Kuipers observes that we can view Eq. 2.1 as the application of the straight rule to n_Q real empirical instances of the strongest property Q and $\lambda(K)/K$ virtual logical instances of Q (1984, pp. 68–69). Why not then account for analogy by analogy with these virtual logical instances? That is, why not add virtual analogical instances of Q to factor in the relative similarities of properties?[14] Let each strongest property Q be associated with $\alpha_Q(e)$ virtual analogical instances that represent Q's similarity to the properties of the evidence. When $n \geq 1$, $\alpha_Q(e)$ is >0, but when $n=0$, the absence of evidence requires that $\alpha_Q(e)=0$. In addition, let $\alpha(e)$ virtual analogical instances represent the summation of similarities that all strongest properties have to the properties of the evidence. The ratio $\alpha_Q(e)/\alpha(e)$ would then indicate Q's portion of total similarity to the evidence. This ratio could therefore be added to Eq. 2.1 as an analogy factor comparable to the empirical and logical factors. Like the empirical and logical factors, the various analogy factors sum to 1. Where $0<\lambda<\infty$, Eq. 2.1 would become Eq. 2.3.[15]

$$p(h_Q \mid e_Q) = \frac{n_Q + \dfrac{\lambda(K)}{K} + \alpha_Q(e)}{n + \lambda(K) + \alpha(e)}. \tag{2.3}$$

Accordingly, the representative function for p* would be adapted for the new method p** as in Eq. 2.4.

$$p^{**}(h_Q \mid e_Q) = \frac{n_Q + 1 + \alpha_Q(e)}{n + K + \alpha(e)}. \tag{2.4}$$

Since the number of possibilities for analogy factors is unlimited, how could we determine the appropriate number of virtual analogical instances? Niiniluoto has described a natural way of measuring degrees of resemblance among strongest

[12] On the relation between the α-λ continuum and the K-dimensional system, see Kuipers (1978, p. 262).

[13] For the α-λ continuum, see Hintikka (1968, p. 228, 1969, pp. 28–33) and Pietarinen (1972, pp. 91–99). For the K-dimensional system, see Niiniluoto (1980, 1981, 1988), Spohn (1981), Costantini (1983), and Kuipers (1984).

[14] My development of this idea differs somewhat from Kuipers'.

[15] The resulting systems are unusual in that they are not indifferent to the order in which predicates are instantiated, thereby violating the axiom of individual symmetry upheld by Carnap (1952, p. 14, 1963, p. 975) and others (e.g., Maher 2000, p. 64). Nevertheless, the probabilities obtained from the various orders of instantiating predicates all converge to the same point (Kuipers 1984, p. 76). For those unwilling to give up the axiom of symmetry, steps toward a satisfactory treatment of analogy may be found in the work of Skyrms (1993) and Festa (1997).

properties (1981, pp. 12–14).[16] Where d_{uv} is the number of primitive properties not shared by the strongest properties Q_u and Q_v, their degree of resemblance r can be expressed by Eq. 2.5.

$$r_{uv} = \frac{1}{1 + d_{uv}}. \tag{2.5}$$

Given primitive properties F and G, for example, Eq. 2.5 determines the degrees of resemblance between the strongest property FG on the one hand and FG, $F\bar{G}$, $\bar{F}G$, and $\overline{FG}$ on the other to be 1, 1/2, 1/2, and 1/3 respectively.

Equation 2.5 affords a particularly simple way of determining appropriate analogy factors. Suppose initially that the evidence manifests just one strongest property. Where Q_u is this strongest property and Q_v is the strongest property of the hypothesis h_Q, let the value of r_{uv} be $\alpha_Q(e)$. Then, where Q_u is once again the strongest property of the evidence, total similarity $\alpha(e)$ would be given by Eq. 2.6.

$$\sum_{v=1}^{K} r_{uv}. \tag{2.6}$$

If the strongest property of the evidence is FG, then the analogy factors for FG, $F\bar{G}$, $\bar{F}G$, and $\overline{FG}$ would be $\frac{1}{7/3}$, $\frac{1/2}{7/3}$, $\frac{1/2}{7/3}$, and $\frac{1/3}{7/3}$ respectively. The factors are expressed in unreduced form to highlight the conceptual links with Eqs. 2.5 and 2.6.

In more complicated cases where more than one strongest property appears in the evidence, $\alpha_Q(e)$ is just the sum of the values of r_{uv} for each property Q_u of the evidence and the property Q_v of the hypothesis h_Q. For $\alpha(e)$ we note that the value of Eq. 2.6 for any strongest property of the evidence equals the value of the same equation for any other strongest property of the evidence, though the individual values of r are distributed differently. Hence where the number of strongest properties instantiated by the evidence is i, $\alpha(e)$ is expressed generally by Eq. 2.7. Examples emerge in Sect. 2.5.2 below.

$$i\sum_{v=1}^{K} r_{uv}. \tag{2.7}$$

Applying p** along these lines reflects the property analogies that unmodified p* does not. As we have seen, p* with $K = 4$ allots probabilities of 1/2 to both A_2's more similar conclusion 'Gb' and the less similar conclusion '$-Gb$'. Under the same assumptions, however, p** with analogy factors of $\frac{1/2}{7/3}$ for $\bar{F}G$ and $\frac{1/3}{7/3}$ for $\overline{FG}$ assigns probabilities of 9/17 (about .53) to A_2's more similar conclusion 'Gb' and 8/17 (about .47) to the less similar conclusion '$-Gb$'. This is not an iso-

[16] Kuipers (1984, p. 67, 73–74) and Niiniluoto (1988, pp. 279–280) offer alternative measures.

lated instance. p** is sensitive to property analogy wherever p* is not. We can use it, therefore, to estimate the probability on the premises of any singular analogical conclusion whatever.[17]

Although I have limited myself to p* for ease of illustration, any of an infinite number of alternative methods can be property-sensitized in the same way. Yet we brush up against a well-known difficulty in doing so: there are, after all, so many of these methods. Since different methods give different values, how do we know which one to choose? This is indeed a problem, but it seems not to have been noticed that there are situations where this embarrassment of methods does not matter at all. The reason is this: knowing merely that one conclusion is more probable than its rivals is sometimes enough; exactly how much more may be superfluous information. Suppose that to be the case with A_2, for example. Yet even though the probabilities of '*Gb*' and '$-$*Gb*' on A_2's premises vary from method to method, their comparative relations do not. '*Gb*' in this context is always more probable than its rival '$-$*Gb*'.

In these cases, probability can profitably be compared to temperature. There are alternative temperature scales, but since jumping from one to another preserves relations of hotter than and colder than, the main thing is to pick a scale and stick with it. Similarly, if all we need to know is which conclusion is more probable, the choice of a method is relatively unimportant. One such situation is described in Sect. 2.5.2.

To conclude this section, let us consider the bearing of these methods on non-monotonic reasoning. Take the stock argument about Tweety, who has become something of a non-monotonic celebrity:

Birds can fly.
Tweety is a bird.
Thus Tweety can fly.

Now if we add the premise 'Tweety is a penguin' to the original premises, we get the conclusion 'Tweety cannot fly'. The conclusions of the initial argument (call it Inference 1) and the augmented argument (Inference 2) are plainly contradictory.

This example appears to cover three basic cases. (1) The first premise might mean 'All birds can fly'. If so, this premise would be false, and we would reject both Inference 1 and Inference 2. (2) The first premise might mean 'Most birds can fly', and we might know that Tweety is a penguin in drawing Inference 1. Then Inference 1 would violate the requirement of total evidence, and we would therefore reject it. (3) The first premise might mean 'Most birds can fly', and we might not know that Tweety is a penguin in drawing Inference 1.

Case 3) covers three subsidiary cases. (3a) When drawing Inference 1, we might know that penguinhood is relevant but just not know how to classify Tweety. Then, when we learn that Tweety is a penguin, we would reject Inference 1. (3b) When drawing Inference 1, we might know that penguinhood is relevant but falsely believe that Tweety is not a penguin. Then, when we discover that Tweety is a penguin, we

[17] Carnap (1963, p. 75, 973–974) came to view these methods as approximations, and they are so regarded here.

would reject Inference 1. (3c) When drawing Inference 1, we might not know that penguinhood is relevant. Then, upon discovering that this background assumption is false, we would reject Inference 1.

Of these multiple possibilities, 1), 3b), and 3c) are quickly decided by appeal to the truth condition on cogent argumentation, and 2) just as quickly by the requirement of total evidence. The remaining case, 3a), is the only one directly relevant to the inductive methods under discussion. The application, I suggest, should be as follows. The conclusions of both Inference 1 and Inference 2 should be understood as following with some probability from their respective premises. The representative function for the method of choice, p** for example, could provide the probability that Tweety can fly given that we do not know whether or not she is a penguin (Inference 1). It could also determine the probability that she can fly given that we know that she is a penguin, and hence the probability that she cannot fly based on the same evidence (Inference 2). The problem is basically one of updating probabilities, and the representative function could supply the prior and posterior values for the probability transition.

2.5 Applying the Standard to Ethical Analogies

Section 2.4 proposed a standard for inductive cogency, situated analogy within the sphere of induction, and outlined a measure of inductive strength for analogical argumentation. The task of the present section is to put these ideas to work. I will attempt to illustrate how they could guide choices between arguments by analogy with phenomenally contradictory conclusions. Success in guiding such choices would mean that disagreements over core classification with vague predicates would be resolvable in principle. Resolving such a disagreement would amount to a reduction of the predicate's vagueness. Though the case study in Sect. 2.5.2 focuses on an ethical predicate, the vagueness of nonethical predicates could be reduced in fundamentally the same way.

2.5.1 Clash Points

We alluded to the early Platonic dialogues in Sect. 2.3, and we must briefly return. Despite their abstract definitional concerns, these dialogues are rooted in a practical problem that is never far beneath the surface. The *Euthyphro* is particularly explicit.[18] In the dialogue's discussion of piety, Socrates identifies two types of disagreement: those that cause hatred and social discord, and those that do not (7b–d). Those that do not include differences over number, size, and weight; those that do concern "the just and the unjust, the beautiful and the ugly, the good and the bad" (7d). These socially divisive disagreements are predominantly moral. However,

[18] The ensuing discussion builds on Welch (1997, pp. 1018–1021).

Socrates gets Euthyphro to see that people do not disagree about moral questions as such; they agree that the wrongdoer should be punished, for example, though they may disagree about whether someone is a wrongdoer (8c–d). These disagreements are disputes "about each action…. Some say it is done justly, others unjustly" (8e).

These socially divisive disagreements have a plainly identifiable root: the vagueness of terms like 'just'. The *Euthyphro* is built upon just this sort of occurrence. Euthyphro says his prosecution of his father is pious, but his family says it is not; Socrates' friends claim that Socrates' actions are pious, but Meletus counters that they are not. The term 'pious' is evidently vague. Structurally similar disagreements over whether an individual action is just or courageous or honest are just as troublesome in our own time as they were in Plato's, and they stem just as clearly from the vagueness of moral terms.

I will refer to disagreements of this concrete and socially divisive sort as *clash points*. Given their attendant social problems, clash points raise urgent normative questions: In such cases, is there a rational way of choosing sides? Provided the interlocutors are willing to give reasons for their views, there is. According to the analogy thesis, reasons for these clashing classifications must ultimately be arguments by analogy, and, as we have seen in Sect. 2.4, good analogies can be distinguished in principle from bad ones. If either of the analogies has a false premise, the analogy should be rejected. But if there is agreement over the truth of the premises, the disagreement over the conclusion must be rooted in conflicting views of the similarity between the controversial act and its prototype(s). That is a resolvable disagreement. Similarity and dissimilarity come in degrees, and quantitative inductive logics like p** provide metrics for measuring them.

The procedure is to form what John Kemeny has called the "minimal language" (1963, p. 722), the simplest language containing the singular and general terms of both premises and conclusion, and determine the conditional probability of the conclusion on the premises with the help of the representative function. If one of the analogies has the form of A_2, for instance, where *a* is the prototype, *b* is the disputed act, and *G* is the controverted moral property, we could argue that due to measurable degrees of similarity, we have more reason than not to assign *G* to *b* (details in Sect. 2.4.3). The predicate '*G*' would continue to be vague, but it would no longer be vague at the clash point.

2.5.2 The Grain Merchant

Suppose we try this out on an example that is complex enough to model real-world difficulties. In *De officiis*, Cicero presents the case of the grain merchant:[19]

> But there are occasions… which frequently arise when there is an apparent conflict between expediency and moral right; in such cases one must take a close look and see whether the conflict is a real one or whether it can be resolved. This category includes questions of the

[19] I follow the Higginbotham translation (Cicero [45–44 B.C.] 1967) except for rendering *frumentum* as 'grain' rather than 'corn'.

> following kind: if, for example, an honest merchant has brought a great quantity of grain from Alexandria to Rhodes at a time when the Rhodians are suffering from great famine and the price of grain is high, and if he knows that more merchants have set sail from Alexandria and has seen their ships on his way sailing in the direction of Rhodes laden with grain, is he to tell the Rhodians or keep quiet and get the best price he can for his cargo? We can assume that he is a wise and honest man, and can for the purposes of our discussion take it that he would not conceal the fact from the Rhodians if he thought it dishonest, but he is in doubt about its honesty. ([45–44 B.C.] 1967, III.12.50, pp. 153–154)

Cicero indicates that the case was a staple of Stoic moral discourse, and that it was a point of contention between Diogenes of Babylon and his disciple Antipater. Diogenes argued that since the grain merchant has not been asked whether the other ships are on the way, to say nothing about them is consistent with honesty. Antipater, on the other hand, thought silence dishonest. Diogenes and Antipater have gone the way of all flesh, but their disagreement has not; it can be revived in almost any contemporary audience. The term 'honest' is vague, and what we have is a genuine clash point.

To have any prospects for resolving it rationally, the disputants must agree about three things. There must be some consensus on prototypes, first of all, on certain actions as bearers of the problem predicate. This is no special requirement, however; agreement on the premises is indispensable for reaching consensus through any kind of inference, inductive or deductive. So let us assume that, as is sometimes the case, the disputants are looking back at the case from a later point in time—our own, for example. Let us say that while they have several disagreements about honesty, there is one (to keep it simple) point of agreement: the Weemsian prototype (Sect. 2.3.2). They agree that it was honest.

Just as important as agreement on a clear positive instance of the predicate is agreement on a clear negative.[20] Having agreed on the Weemsian prototype, we might suppose that George is asked whether he cut down the cherry tree but that he answers differently: "I can't tell a lie, Pa; you know I can't tell a lie. I did *not* cut it down with my hatchet." This action is clearly dishonest, and our knowledge that it is constitutes part of our evidence. Hence it should be included as a premise of the argument.

The final matter for agreement is what features of the case are morally relevant. Like all induction, moral induction requires selecting out, from all the properties of the objects under discussion, those that are relevant to the question.[21] These are the only properties that figure in the minimal language, and they are the primitive properties that make up the K strongest properties for determining relative width. Suppose, then, that the disputants agree that, with one exception, the template of

[20] I am indebted to Jesse Hughes for spotting a difficulty in an earlier version of this argument.

[21] Though the issue of relevance deserves more attention than I can give it here, I expect both widespread agreement and occasional disagreement over what counts as morally relevant. Such disagreement need not be unresolvable; our goals determine what is relevant. But the point for the moment is that 'relevant' is a vague term. Just as disagreement over borderline cases of a vague term may prevent determination of deductive soundness, disagreement over borderline cases of relevance may do the same for inductive cogency.

Sect. 2.3.2 identifies the morally relevant features. The exception is feature 1, the filial relation, which is counted out as irrelevant. Consequently, the features agreed to be relevant are: *g*'s belief that *p* (call this property *B* for short); *g*'s selfish desire that *f* not come to believe *p* (property *D*); *f*'s asking *g* whether *p* is true (property *A*); and *g*'s conveying to *f* that *p* is true (property *C*).

Where property *H* is honesty, *a* is the Weemsian prototype, *b* is the aforementioned negative instance where George conveys misinformation, and *c* is the problem case of the merchant, the analogical argument leading to Antipater's conclusion that the grain merchant's silence is not honest can be represented as:

A_3:

$Aa \wedge Ba \wedge Ca \wedge Da \wedge Ha.$
$Ab \wedge Bb \wedge -Cb \wedge Db \wedge -Hb.$
$-Ac \wedge Bc \wedge -Cc \wedge Dc.$
Hence $-Hc$.

Once the argument is explicitly set out, determining whether 'Hc' or '$-Hc$' is the better conclusion is straightforward. The question of whether the grain merchant's case is more similar to the clear positive or the clear negative case is actually evident by inspection:

Positive:	$ABCD$
Grain merchant:	$\bar{A}B\bar{C}D$
Negative:	$AB\bar{C}D$

In fact, the greater similarity of the merchant's case to the clear negative is easily quantified. Availing ourselves of Eq. 2.5, Niiniluoto's measure of resemblance between strongest properties, we have

$$\mathrm{r}(ABCD, \bar{A}B\bar{C}D) = 1/3$$
$$\mathrm{r}(AB\bar{C}D, \bar{A}B\bar{C}D) = 1/2.$$

The process of quantification can be carried a step further still by recalling the methods of Sect. 2.4. Because the disputants believe the argument's premises to be true, the clash over the conclusion must stem from divergent estimates of the support provided by the premises to the conclusion. Suppose we use p** to mediate. Since there are five primitive properties, there are $2^5 = 32$ strongest properties. The premises assert the strongest properties $ABCDH$ and $AB\bar{C}D\bar{H}$, and the rival conclusions (together with the third premise) imply the strongest properties $\bar{A}B\bar{C}DH$ and $\bar{A}B\bar{C}D\bar{H}$. To represent the relevant similarities, we can rely on Eqs. 2.5 and 2.7. They determine analogy factors of $\frac{1/4}{21} + \frac{1/2}{21} = \frac{3/4}{21}$ for $\bar{A}B\bar{C}D\bar{H}$ and $\frac{1/3}{21} + \frac{1/3}{21} = \frac{2/3}{21}$ for $\bar{A}B\bar{C}DH$. Then p** assigns a value of 21/41 (about 0.512) as the probability of A_3's conclusion on its premises and a probability of 20/41 (about

0.488) to the rival conclusion that the merchant's silence is honest. Marginally, then, and relative to the Washingtonian evidence, the grain merchant's silence is more dishonest than honest. The extension of 'honest' could therefore be clarified by subtracting the action of the grain merchant's silence. This would be one pass in the inductive molding of the concept of honesty.

Whatever else we may want to say about this conclusion, I think it accords well with at least one of our convictions about the case. Since the rival conclusions are intuitively very close, an assignment of .80, say, to one of them would clearly have been wrong. Nevertheless, this conclusion may not jibe with all of our convictions. It should do so only if our convictions are based on exactly the same evidence. The conclusion that the grain merchant's silence is honest can be shown to follow from a different evidential base. But it does not follow from this one.

As we noted above in connection with A_2, any of p**'s property-sensitized cousins will give slightly different probabilities for A_3's conclusion. Knowing which are the exact values would indeed be welcome. But here we are fortunate; that is beside the point. To resolve disagreements over clash points like the grain merchant's, all we really need to know is which conclusion is more probable, and that has been accomplished. It is an elementary matter to show that the greater probability of '$-Hc$' relative to 'Hc' on the premises of A_3 is invariant across these methods.

Up to this point our discussion of the grain merchant has tacitly assumed that the relevant predicates have equal logical weight. This assumption need not always hold, and it can be jettisoned at will. The key is to take a hint from Carnap's Basic System, which accommodates unequal as well as equal logical weights (1971, 1980). Each strongest property Q can be correlated with $\lambda_Q > 0$ virtual logical instances. The sum of the various λ_Q is λ, which represents total logical weight. Hence each strongest property can be outfitted with a logical factor λ_Q/λ that expresses its share of the system's logical weight. Like empirical and analogy factors, these logical factors must sum to 1. The result is the generalization of Eq. 2.3 (Kuipers' replacement for the representative function of the λ-continuum) expressed by Eq. 2.8.

$$p(h_Q \mid e_Q) = \frac{n_Q + \lambda_Q + \alpha_Q(e)}{n + \lambda + \alpha(e)} . \tag{2.8}$$

In the case of the grain merchant, for example, we might regard any strongest property that includes the combinations ACH or $A\bar{C}\bar{H}$ as particularly significant. We might be willing to allot more logical weight to the 8 strongest properties in which these combinations appear than to the remaining 24 properties. Instead of the single virtual logical instance employed under p**'s assumption of equal logical weight, we might apportion 1.5 logical instances to the more significant properties and 0.5 instances to the less significant ones. Since 8 "heavy" properties and 24 "light" ones would require a total of 24 virtual logical instances, each heavy property would have a logical factor of $\frac{3/2}{24}$ and each light property a logical factor of $\frac{1/2}{24}$. Like the analogy factors, the logical factors are expressed in unreduced form in order to make the number of their virtual instances transparent.

Using these logical factors and the same analogy factors as before, Eq. 2.8 determines the probability of A_3's conclusion '$-H$' on its premises to be 15/29 (about 0.517) and that of the rival conclusion 'H' to be 14/29 (about .483). Note that the probability of '$-H$' is slightly higher when the strongest property $\bar{A}B\bar{C}D\bar{H}$ receives .5 logical instances than when it receives 1 such instance (using p** above). Under our assumptions, Eq. 2.8 applied to A_3 is a decreasing function that approaches .5 as a limit when $\lambda_Q \to \infty$.

2.6 Conclusion

Understanding classification as proposed in this chapter has three principal advantages. The first is that it saves the phenomena. The phenomena identified in Sect. 2.1 are established classifications of an object as green, say, or an action as compassionate. Seeing classification as analogy permits us to explain these phenomena as analogical conclusions that meet the standard for inductively cogent arguments by analogy outlined in Sects. 2.4.1–2.4.3. The contradictories of these conclusions, on the other hand, fail conspicuously to meet this standard.

Secondly, the same approach that saves the phenomena furnishes a piecemeal solution to the problem of vague predicates. Recourse to the standard of inductive cogency permitted a solution to the vagueness of 'honest' in the case of the grain merchant and furnished an instance of inductive molding, as we saw in Sect. 2.5.2. I hasten to add, however, that appeal to inductive cogency can provide no more than an in-principle solution to the problem of vagueness. Even if correct, this solution cannot be expected to transmute acrimony into harmony at the world's clash points. The reasons can be gleaned immediately from two sets of considerations derived from the deductive special case.

The first difficulty is suggested by how little incidence a proof procedure for first-order logic has in our courts, congresses, and corporate boardrooms. The underlying causes were identified long ago by Socrates: the will to power and wealth of the interlocutors. These motives would sabotage any appeal to the standard for inductive cogency as well. But where debates are animated by the collaborative spirit of Socrates' conversation with Crito, it is possible to address the problem of vagueness by invoking this standard. The problem, of course, is that debates are rarely so motivated, even in philosophy.

Yet a second set of difficulties would remain even if we can count on the irenic spirit of Socratic dialogue. As with all logical formalisms, applying the standard for cogent arguments by analogy can be arduous. First, as we have noted, consensus through inference cannot be achieved without prior agreement on the premises. In the deductive case, vagueness, ambiguity, and lack of empirical information may create disagreement over the truth of an argument's premises, and the result can be disagreement over the soundness of the argument. The same snags can wreak the same havoc with inductive cogency. They can, in extreme cases, even impede consensus over prototypes. Second, inability to agree on which features are morally

relevant can actually prevent the premises from being formulated in a mutually acceptable way. One person might formulate premises with one set of relevant features, and another might insist on a divergent set. Finally, just as the deductive validity of very complex arguments can be determined in principle but only with difficulty in practice, the same is true of inductive strength. The evidence for a given conclusion may be quite complex. Nevertheless, the inductive methods discussed in this chapter are complete: for any noncontradictory premises and conclusions that are formulable in the language for which the method is defined, the probability of the conclusion given the premises can be determined in principle (Carnap 1952, pp. 16–18, 30–32).

Despite these cautionary notes, the theoretical difficulties attending the standard for cogent arguments by analogy are not insuperable. The same point holds for ethical and nonethical analogy alike. The focal predicate in the case of the grain merchant is ethical, but the vagueness of nonethical predicates can be reduced piecemeal through the same procedure of inductive molding. Though this is a hypothesis subject to further investigation, the formality of the present approach already provides strong confirmation. For the conclusion of any argument isomorphic to A_3 would be more probable than a contradictory conclusion based on the same premises regardless of whether the constituent predicates are ethical or not. In addition, this inductive procedure has the cognitive virtue of full coherence with our habitual criterion for sound deductive arguments, making it a natural candidate for a principled approach to vague predicates.

The third advantage of treating classification as analogy is that it provides a badly-needed corrective to one form of Aristotelian intuitionism. Aristotle thought we just *see* that we should be angry with a certain person in a certain way for a certain length of time. The decision, he claimed, "rests with perception" (*aisthēsis*), and perception is the work of the faculty of intuition (*noûs*).[22] Aristotle is disturbingly complacent about these intuitions:

> Hence any one who is to listen intelligently to lectures about what is noble and just and, generally, about the subjects of political science must have been brought up in good habits. For the facts are the starting-point, and if they are sufficiently plain to him, he will not need the reason [for the facts] as well; and the man who has been well brought up has or can easily get starting-points. (*Nicomachean Ethics* 1095b5–9)

The view that the decision rests with perception has proved to be attractive to moral particularists.[23] One reason for this is that the view does capture the psychological assurance we feel in moments of righteous anger, for instance. I grant that psychological description has its place. But it also has its limits. One limit of the view that the decision rests with perception is that it is critically toothless. If there is anything that experience teaches us, it is that mistakes are possible even in these moments of

[22] *Nicomachean Ethics* 1109b14–23, 1143a35–b5. Cf. Ross (1930, pp. 29–30, 41–42), Wiggins (1980, pp. 235–237), and Nussbaum (1990, pp. 54–104).

[23] For example, McDowell (1979, pp. 331–350), Nussbaum (1990, pp. 37–40, 54–105), and Dancy (1993, p. 50). However, T. H. Irwin maintains that Aristotle was not a moral particularist (2000).

high intuition. The person of "good habits"—Aristotle himself, for instance—might just *see* that an instance of slavery is just. We just happen to *see* it otherwise.

Italicizing the word 'see' is not an argument. Some way of adjudicating between rival intuitions is needed, and the standard for cogent arguments by analogy provides one. Aristotle's belief that slavery is just was not without rational support, as we saw at the outset of Sect. 2.4. He could have defended it by analogy with prototypically just cases of parents governing their children, for instance. And he could have claimed that the inferiority of slave to master is analogous to that of child to parent because both are due to biologically imposed limitations on reason. The slave, he remarked, has "no deliberative faculty at all" (*Politics* 1260a12–13; cf. 1254b20–24). But this is where the analogy breaks down, of course; any deliberative ineptness attributable to slaves as a class was imposed by nurture, not nature. Aristotle's argument by analogy includes a false premise, therefore. Because it includes a false premise, it fails to meet the standard of inductive cogency.

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