Borderline Hermaphrodites: Higher-order Vagueness by Example

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The Pyrrhonian sceptic Favorinus of Arelata personified indeterminacy, cultivating his (or her) borderline status to undermine dogmatism. Inspired by the techniques of Favorinus, I show, by example, that ‘vague’ has borderline cases. These concrete steps lead to a more abstract argument that ‘vague’ has borderline borderline cases and borderline borderline borderline cases. My specimens are intended supplement earlier non-constructive proofs of the vagueness of ‘vague’.

Who was the first female philosopher? The ‘natural eunuch’, Favorinus of Arelata (c. AD 80–150), may have rendered the question moot.

A hermaphrodite who leaned toward the male end of the spectrum was more likely to be granted the benefit of the doubt — and enjoy the prerogatives of manhood. Yet Favorinus did not rest on the benefit of the doubt. He (and I now take refuge in the generic sense of ‘he’) courted ambivalence by speaking and dressing effeminately. This flamboyant Pyrrhonian summed up his life in three paradoxes; he was a barbarian from Gaul who spoke Greek, a eunuch accused of adultery, and a citizen who quarrelled with an emperor and yet lived.

Favorinus’ skill at balancing each argument with a counter-argument made him a popular teacher of upper class Romans. When silenced by Emperor Hadrian in argument, Favorinus later explained that it would be foolish to criticize the logic of the master of thirty legions. When the Athenians pulled down a statue they had erected to Favorinus, Favorinus speculated that had there been a statue of Socrates, Socrates might have been spared the hemlock.

This philosopher (or was Favorinus a mere sophist or rhetorician or provocateur?) was not ready to die for his beliefs! Favorinus cultivated not only doubt, but also doubts about doubts, and doubts about those doubts. As Galen ruefully recounts in The Best Education, Favorinus first recommends that students be left to make up their own minds,
then in Plutarch allows for the possibility of certainty, and then in Alcibiades argues nothing can be known. Favorinus was more of a meta-agnostic than an agnostic and more of a meta-meta-agnostic, than a meta-agnostic. Favorinus can only be approached asymptotically; we get closer but never quite make contact. As a borderline case of ‘woman’ or perhaps a borderline case of ‘a borderline case of a “woman”’, Favorinus had a predilection for embedded doubts.

1. An antithetical trend

Most solutions to the sorites paradox employ theories of vagueness that cannot model borderline borderline cases. If higher-order vagueness is an illusion, then this impotence becomes a virtue rather than a vice.

Desire for this transformation has created a market for objections to higher-order vagueness. At the mild end of the spectrum is a mathematical objection. The typical sorites argument concerns a finite sequence. Given that a finite number of things can only be ordered in finitely many ways, there cannot be infinitely many levels of vagueness.

However, there are slippery slope arguments with infinite domains (Sorensen 1994, pp. 53–4). For instance, the sorites-monger can argue that all real numbers are small. Although he cannot validate the inference with mathematical induction, the sorites-monger can switch to inference rules that do not rely on there being a next item in the sequence. Since vague predicates apply to both actual and possible instances, the relevant domain for higher-order vagueness is infinite rather than finite.

Psychology suggests alternative grounds for damping down higher-order vagueness. Although Stewart Shapiro (2006, p. 135) is unsure whether there is any higher-order vagueness he is confident that any such iteration will only climb a few levels. Attributions of borderline status are predictions of divergence between speakers. So the judgement that Favorinus is a borderline borderline woman amounts to a prediction of a prediction of divergence between competent speakers. To be psychologically realistic, these meta-predictions need to reflect the limits on memory and processing power of the human beings who speak the language.

Shapiro’s arguments grate against Noam Chomsky’s distinction between competence and performance. Chomsky abstracts away from accidental limits on human attention and memory. He urges us to
spell out competence in terms of recursive grammars. These are congenial to unbounded iterations.

Conceivability arguments avoid conflict with Chomsky’s constraints. Michael Tye can imagine the possibility of there being borderline cases of ‘borderline small number’. But Tye (1990, p. 537, n. 5) cannot think of any actual examples. A natural explanation of his inability to find any borderline borderline cases is that there are no definite instances. Consequently, Tye (1990, pp. 550–2) infers it is indefinite whether there is any higher-order vagueness.

This is too concessive for Richard Deas (1989). He asserts borderline cases of ‘vague’ are inconceivable: ‘We have no difficulty in recognizing or imagining borderline cases of “small”, but the idea of something which is neither clearly vague nor clearly otherwise is incomprehensible’ (Deas 1989, pp. 28–9).

Crispin Wright (1987, pp. 244–5) proposes a semantic principle that would underwrite this incomprehension: vague predicates are judgement-dependent. What makes a colour red is just the fact that all competent speakers, under ideal conditions, judge it to be red. If some speakers think it is red and others think it is not red, then the colour is a borderline case. Since these ideal speakers can detect departures from unanimity, they can locate the last definite red shade in a spectrum. So Wright concludes that all borderline cases are definite borderline cases.

Delia Graff Fara (2000, p. 80) argues for the opposite principle that all borderline cases are indefinitely borderline. She defies anyone to specify a borderline case.

Fara’s challenge brings to mind W. B. Gallie’s essentially contested concepts. These are ‘concepts the proper use of which inevitably involves endless disputes about their proper uses on the part of their users’ (1956, p. 172). Gallie claims ‘religion’, ‘culture’, and ‘artwork’ are essentially contested. However, each of these putative examples is controversial. Gallie might boldly co-opt this dissent by insisting that a concept’s status as essentially contested is itself essentially contested. One consequence of this manoeuvre is that no one would be able to prove by example that there are some essentially contested concepts. Similarly, if Delia Graff Fara is right in thinking that any attribution of borderline status is contestable, then no one can prove by example that a given predicate is vague. This would doom my project of proving, by example, that there is higher-order vagueness.

More gloom descends from Diana Raffman’s category restriction on indeterminacy: to be borderline is to be borderline between contrary
expressions within the same family. Favorinus can be borderline between being a woman and a man — but not between being a woman and not a woman. According to Raffman, ordinary usage manifests a semantic requirement for contraries (rather than a pragmatic preference for the superior specificity of contraries over contradictories). Since ‘borderline F’ and ‘not borderline F’ are not contraries, there can be no borderline cases between ‘borderline F’ and ‘not borderline F’.

… any potential drawbacks of eliminating higher-order borderline cases are mitigated by the fact that the notion has no obvious basis in commonsense. I have not heard an ordinary speaker call something a borderline case of a borderline case, much less a borderline borderline borderline etc. case: in fact I doubt that ordinary speakers would make much sense of the idea. (Raffman 2005, p. 23)

Just as only some nouns can be used for counting, only some pairs of nouns can be used in attributions of borderline status.

2. Spontaneous iteration

My defence of borderline borderline cases is inspired by Favorinus’ recursive techniques for achieving ataraxia (tranquility through suspended judgement). To cultivate these elevated states of doubt, Favorinus first explored how doubts about doubts grow in the wild. I emulate Favorinus by first concentrating on how borderline borderline cases sprout naturally between categories, and then cultivating their indeterminate offspring to artificial heights.

Let us follow Favorinus’ practice of entering large issues osmotically through the pores of etymology. Philologists tell us that readers of Ovid introduced ‘hermaphrodite’. In Metamorphoses, Hermaphroditos is the son of Hermes and Aphrodite (the gods of male and female sexuality). The nymph Salmacis loved Hermaphroditos. Her prayer for union resulted in their fusion.

Since borderline status is relative to a predicate, indeterminacy can be artfully reversed. In Plato’s Symposium, Aristophanes characterized hermaphroditism as a return to an original ideal state. The jealous Zeus split the two-headed, four-armed, four-footed, human beings into males and females. These partially defined beings then strive for completion.

‘Hermaphrodite’ was introduced to cope with borderline males. Such intermediate categories only bring temporary respite from taxonomic stress. After the criteria for assignment into the ad hoc category
conventionalize, attention turns to borderline cases in which these criteria are neither definitely satisfied nor definitely violated. For instance, there are pseudo-hermaphrodites who only possess superficial traits of the opposed gender. Since superficiality comes in degrees, there are borderline pseudo-hermaphrodites.

The cycle is familiar to lawyers. Reformers undercut litigation about borderline cases by legislating an intermediate category. However, the new category itself has vague boundaries. The lawyers exploit the fresh opportunities for litigation — precipitating a new round of legislation.

The maxim ‘Hard cases make bad law’ is used to justify the practice of ignoring borderline cases. By sticking to clear cases, we get simple cases.

The medical community prefers to suppress borderline cases by operationalizing. Consider the history of ‘borderline borderline personality’ in psychiatry. A subclass of patients who were borderline between being psychotic and neurotic were eventually classified as having a borderline personality. As the diagnostic criteria became disseminated through the *Diagnostic and Statistical Manual*, borderline cases of this intermediate category were identified. This new round of anomalies prompted a further category: borderline borderline personality disorder.

A lengthier philology underwrites the dermatologist’s description of “borderline-borderline/borderline-tuberculoid (BB/BT) patients” (Goulart et al. 2000, p. 330). Were it not for the linguistic conservatism inaugurated by the printing press (and nurtured by the regimentation of diagnostic description imposed by medical dictionaries), this awkward expression would have been replaced by a term whose brevity would submerge the layers of vagueness.

3. Masking by repetition avoidance

Audio books dumbfound listeners with sentences such as Stephen Hawking’s ‘There are something like ten million million million million million million million million million million million million million (1 with eighty zeroes after it) particles in the region of the universe that we can observe’ (1988, p. 129). The sentence is grammatical, as witnessed by its being demonstratively false; Hawking’s iteration of ‘million’ yields a number with eighty-five zeroes after it. Yet when we listen to the sentence, it sounds like monotonous mumbo jumbo.
Phoneticists trace some of the bias against repetition to biomechanical challenges in re-articulating and re-listening. To avoid the strain, we superficially suppress the repetition by substituting synonyms or near-synonyms — as in ‘borderline pseudo-hermaphrodite’.

The challenges posed by limited auditory processing are best surmounted by putting the issue in writing. As complexity increases, written philosophy prevails over oral philosophy (contrary to Plato) for the same reason written arithmetic prevails over oral arithmetic. The permanence of inscriptions eases the burden on memory and processing.

The computational advantage of shifting the burden from the ear to the eye explains the popularity of the indefinite operator ∇ for ‘it is indefinite whether’. Instead of saying Favorinus is a borderline borderline borderline woman, write ∇∇∇(Favorinus is a woman). Questions of higher-order vagueness can then be framed syntactically — as in ‘Does ∇∇p → ∇p hold?’

Since the answer is no, second level vagueness does not entail first level vagueness. It might be indefinite whether it is indefinite whether Favorinus is male. A borderline precise language has indefinite borderline cases but no definite borderline cases.

4. The ambiguity of ‘borderline case’

The switch to writing is of more limited assistance with another difficulty introduced by repetition: ambiguity. For instance, some ‘contrastive reduplications’ (Ghomeshi et al., 2004) narrow a nominal referent to a prototypical category member, as in ‘salad salad’ (a garden salad as opposed to a tuna salad), ‘bird bird’ (a robin rather than a penguin), and ‘girl girl’ (a dainty female as opposed to a tomboy). In this spirit, a ‘borderline borderline case’ could be interpreted as a paradigm example of a borderline case.

Hermaphrodites are prototypical borderline cases but ‘male’ is not a prototypical vague term. Prototypical members of a category are more quickly recognized as belonging to the category than peripheral members. Just mentioning ‘furniture’ primes you to think of chairs, not lamps. Little wonder that speakers choose prototypical cases as exemplars.

Gradable adjectives (‘bald’, ‘tall’, ‘red’) are prototypical vague terms. They are more quickly recognized as vague than non-gradable adjectives (‘pregnant’, ‘empty’, ‘awake’).
'Female' is a poor example of a vague term because nearly all cultures demand decisive gender identifications. Nevertheless, 'female' is definitely vague.

Just as there is a difference between definite vagueness and prototypical vagueness, there is a difference between being a definite borderline case and being a prototypical borderline case.

‘Borderline borderline F’ is ambiguous between incompatible readings. If it is read as 'a prototypical borderline F', then it entails being definitely borderline. If it is read as ‘an indefinite borderline F’, then it precludes being definitely borderline.

Concrete circumstances disambiguate words that have contrary senses such as oversight (attention/inattention), buckle (secure/collapse) and sanction (permit/restrict). In an abstract setting we are more apt to get as confused as Amelia Bedelia. (She is the literal minded maid in children’s books; when told to dust the furniture, Amelia adds dust instead of removing dust.) Sceptics about higher-order vagueness detect the antonymic confusion caused by ‘borderline borderline’. They project this vertigo on to the concept of borderlinearity.

5. Degrees of borderlinearity

Repetition can also be read as intensification. Here we read 'hot hot soup' as very hot soup (rather than as prototypical hot soup).

In the intensification sense, a ‘borderline borderline case’ has a high degree of borderlinearity and so is definitely borderline. Just as any degree of obtuseness suffices for being an obtuse angle, any degree of borderlinearity suffices for being borderline.

We are doubly sure Favorinus is a borderline case of ‘the first female philosopher’ because of doubt about whether Favorinus is a woman plus doubt about whether Favorinus is a philosopher. A borderline case can be made more securely indeterminate by adding further conceptual uncertainties. One measure of this enhanced security is the greater number of favourable precisifications that are needed to count the borderline F as an F.

The addition of indeterminacy-makers increases the weight of evidence for indeterminacy while simultaneously decreasing the degree of indeterminacy we are warranted in attributing. John Maynard Keynes (1921, p. 71) observed that the weight and probability of an argument often diverge. A larger sample may buttress a prediction suggested by a
small sample while simultaneously making that prediction somewhat less probable.

When extra indeterminacy-makers fortify an indeterminacy attribution, the enhanced security does not trickle down to any lower-level indeterminacies. This explains the stability of borderline borderline cases.

6. Multi-dimensional borderline cases

Adding indeterminacy-makers increases the weight of an indeterminacy attribution. This suggests a procedure for meeting Delia Graff Fara’s challenge to specify borderline cases. Suppose we wish to specify a compelling borderline case of ‘island’. First, collect sources of indeterminacy. For instance, a body of land can be a borderline island by virtue of its small size. It can also be borderline by virtue of being submerged or by being a borderline peninsula or by being composed mostly of ice (which makes the putative island resemble a grounded iceberg). After collecting these indeterminacy-makers, note which work in the same direction. These factors must be checked for interference. For instance, islands can be made more indeterminate by shrinking them or enlarging them (‘Is Australia the biggest island or the smallest continent?’) but these processes are not co-executable. Lastly, adapt the Pyrrhonian technique of equipollence. That is, add indeterminacy-makers until the interlocutor is stalemated into doubt.

If the interlocutor puts up strong resistance, the recipe may yield a complicated case that straddles several competing categories. Consider the hypothetical Island of Doubt. This is a recently flooded ‘island’ with enough connection to the mainland to make it a candidate peninsula. Yet the Island of Doubt is also composed of enough ice to make it a borderline case of a grounded iceberg.

One advantage of analyzing ‘borderline F’ as being borderline between F and not F (rather than in Raffman’s fashion) is that we accommodate the unity of borderline cases. We do need to say that there are four borderline cases: the island/peninsula case, the island/iceberg case, the island/protrubence case, and the island/… well, what is that contrary?

Using complements as relata also allows us to side step the vagueness of ‘contrary’. Often, it is unclear whether two terms are mutually exclusive. Does ‘left-handed’ preclude ‘right-handed’? That depends
on whether ambidextrous people are classified as being both left-handed and right-handed or are classified as being neither.

‘Contrary’ itself has contraries such as ‘complement’ and ‘independent’. There are borderline cases between these proximate contraries. The vagueness of ‘contrary’ ensures that there will be some borderline borderline cases even given Raffman’s requirement that borderline status be between proximate contraries.

7. Literal or metaphorical?

My natural specimens of higher-order vagueness will breed a pair of predicates such that it is definite that one is vague and the other is precise, but indefinite which one is vague and which is precise. These borderline cases of ‘vague’ are intended to defend and extend an earlier non-constructive proof of the vagueness of ‘vague’ (Sorensen 1985). The examples just provide more data and play to our strengths as concrete thinkers.

‘Vague’ belongs to a semantic field of meta-linguistic adjectives: ‘ambiguous’, ‘general’, ‘figurative’, ‘literal’, ‘meaningless’, and so on. These neighbours have indistinct borders. Suppose we ask ourselves … whether ‘extended’ is metaphorical in ‘after an extended delay, the game resumed’. Is ‘calm’ literal in connection with people and metaphorical as applied to bodies of water, or the other way around—or literal in connection with these and metaphorical when applied to historical eras? What about the ‘backs’ and ‘fronts’ of animals, houses, pieces of paper, and parades? Questions like these seem unanswerable, and not because one doesn’t understand ‘calm’ and ‘front’. (Yablo 1998, p. 256)

We know that ‘calm’ applies literally to one category of things and metaphorically to another range of things but we cannot tell which is the literal range and which is the metaphorical. Thus we cannot tell whether the following is a sorites argument:

(1) Any lake with waves of less than 1 millimeter is calm
(2) If a lake with waves of less than \(n\) millimeters is calm, then so is a lake with waves of less than \(n + 1\) millimeters
(3) Any lake with waves of less than a million millimeters is calm

If ‘calm’ applies only metaphorically to lakes, then the base step is not true and the argument is not a sorites. If ‘calm’ applies literally, then
the base step is true and the argument is a sorites paradox. Thus ‘calm lake’ is a borderline case of ‘vague predicate’.

Borderline cases of ‘metaphor’ come in degrees. There can be a smooth sequence of mathematical inductions such that the first definitely has a metaphorical induction step and the last definitely has a literal induction step. The calm lake argument is somewhere in the middle.

Dying metaphors begin from the clearly metaphorical end of the continuum and decline imperceptibly toward literality. A dead metaphor such as ‘foot of a hill’ has lost its figurative power and has become part of literal speech. Consider an argument whose inductive predicate begins as metaphor.

(1) One millimeter up the (seventy meter) Palatine Hill is at the foot of the Palatine hill

(2) If \( n \) millimeters up the Palatine Hill is at the foot of the Palatine Hill, then \( n+1 \) millimeters up the Palatine Hill is at the foot of the Palatine Hill

(3) Fifty thousand millimeters up the Palatine Hill is at the foot of the Palatine Hill

Early metaphorical uses of this argument are not paradoxical because their base steps are obviously false (hills do not have feet). But as the metaphor dies, the later uses of the argument become gradually soritical; ‘foot of the Palatine Hill’ metamorphosizes from an empty phrase having no definite instances and no borderline instances to a phrase having both definite instances and borderline instances.

Metaphor turns some precise words into vague words. ‘Myriad’ is derived from the Greek term for 10,000. In contemporary English, ‘myriad’ is borderline between being a dying and a dead metaphor. If the metaphor is still breathing, ‘myriad’ continues to denote 10,000 and so is a precise word of a sort with ‘trillion’ (which is often used metaphorically even among those who do not know which number ‘trillion’ denotes). The following argument would then have an induction step that is falsified by the case in which \( n = 9,999 \):

(1) One is less than a myriad

(2) If \( n \) is less than a myriad, then \( n+1 \) is less than a myriad

(3) A million is less than a myriad
The alternative is that ‘myriad’ is a dead metaphor in which it literally means a large, indefinite number. ‘Myriad’ is then vague and the argument is a sorites paradox. Given that it is indefinite whether ‘myriad’ is metaphorical or literal, it is indefinite whether ‘myriad’ is vague. Samuel Taylor Coleridge’s ‘Myriad myriads of lives teem’d forth from the mighty embracement’ (from ‘Hymn to the Earth’) mesmerizes the reader by strength of numbers — but by any precise number?

I have kept the myriad example purely numeric. At least some of the vagueness of the impure phrase ‘myriad lives’ can be traced to the vagueness of ‘life’.

My goal is to show the internal vagueness of ‘vague’. The instructive borderline cases of ‘vague’ embroil the terms used to define it (‘inquiry resistant’, ‘indefinite’, ‘admissible precisification’) or test it (‘sorites embeddability’, ‘ambivalence’, ‘tolerant’) or to characterize relations to neighbours in its semantic field (such as ‘ambiguous’, ‘general’, ‘literal’, ‘ill-defined’, and so on). Vagueness plays a conceptual role in the dissolution of disputes, assessments of linguistic competence, and the exercise of discretion. These roles often conflict and trail off in a way that illuminates the concept of vagueness.

8. Vague or nonsense?

According to F. T. Porter’s Gleanings and Reminiscences, a theatre proprietor introduced ‘quiz’. Richard Daly wagered that in two days he could make a nonsense word known throughout Dublin — and that the public would give a meaning to it. Daly printed cards with ‘quiz’ written on them. After a performance at his theatre, Daly distributed these cards to his staff and instructed them to write the word on walls around the city. ‘Quiz’ became the talk of the town.

If ‘quiz’ was introduced as Porter relates, there must have been a period in which it was a borderline case of a vague word. For there would have been a period in which it was indefinite whether ‘quiz’ was part of English.

What goes for words goes for languages as a whole — and language as a general phenomenon. We cannot date the origin of vagueness because we cannot date the origin of language (or the underlying mentalese postulated by linguists). Thanks to the developmental nature of each organism and the gradual character of the evolution of species, the origin of indeterminacy is indeterminate.
'Vague word' is vaguer than 'precise word' because there is more uncertainty in distinguishing vague terms from make-believe words and meaninglessness. 'Zillion' is definitely not a precise word. But it might be a vague word. ‘Zillion’ is modelled on numerals such as ‘million’, ‘billion’, and ‘trillion’. Some dictionaries claim ‘zillion’ means an indefinite large number. But it might just be a meaningless term that is playfully presented as a numeral.

Indeed, it is tempting to see ‘zillion’ as part of running joke. Speakers keep the tradition alive with regular renovations of the façade: jillion, kabillion, bazillion, and googillion are recent updates. Given the possibility that ‘zillion’ is meaningless, it is difficult to say whether the following is a sorites argument:

(1) One is less than a zillion
(2) If $n$ is less than a zillion, then so is $n+1$
(3) $10^{99}$ is less than a zillion

Whereas ‘myriad’ definitely is a word and may even be precise, ‘zillion’ may not even be meaningful.

9. Direct cases

In the previous section, I generated borderline cases of ‘vague’ with borderline sorites arguments for ‘calm lake’, ‘quiz’, ‘myriad’, and ‘zillion’. We cannot tell whether ‘myriad’ is vague rather than metaphorical and cannot tell whether ‘zillion’ is a real word or a playful, make-believe word. ‘Vague’ and ‘precise’ are drawn into the border disputes of their neighbours (such as distinction between metaphor and literal speech) because these rivalries affect the extension of ‘sorites argument’.

Direct competition between ‘vague’ and ‘precise’ is hard to detect within natural languages. This is partly due to the prevalence of vagueness. This factor interacts with the asymmetry of confirmation and disconfirmation. Attributions of precision involve a universal generalization; a precise term must have no borderline cases. Confirmation will be inductive (unless an exhaustive inspection is feasible). Attributions of vagueness only require showing there is at least one borderline case. That is much easier and so attributions of vagueness enjoy the decisiveness of a deductive proof.

Despite this formidable pair of obstacles, there is a transcendental proof that some predicate must not be definitely vague. If all predicates
were definitely vague, then ‘vague’ would lack borderline cases. It would be a precise predicate and so be a counterexample to the generalization ‘All predicates are definitely vague’. This is not quite a proof that some predicates are precise but it shows that we are never in a position to faultlessly assert that all predicates are vague.

As we learn from mathematics, precision is easier to prove if we micro-manage the process by which the predicate gains meaning. This method of border control can be manipulated to achieve an intermediate effect. I will gerrymander a pair of predicates so that we can prove one is precise and one is vague — but I will also make it indefinite which is the precise predicate. Both predicates will be borderline vague.

10. Vague or Precise?

An ‘electric prime’ is a small prime that has the same parity as the number of electrons. (Electrons are qualitatively identical and so do not generate any collateral vagueness with respect to their creation or destruction.) Numbers have the same parity if and only if they are either both odd or both even. If the number of electrons is even, then ‘electric prime’ denotes only the number 2 because 2 is the only even prime. ‘Electric prime’ would then be a precise predicate. If the number of electrons is odd, then 3, 5, and 7 are electric primes but the vagueness of ‘small’ prevents any number from being definitely the last electric prime.

Since there is no way to know whether ‘electric prime’ is vague, it is unknowable whether the following argument is a sorites paradox:

1. Three is an electric prime
2. If a prime is an electric prime, then the next prime is also an electric prime
3. Therefore, $2^{43,112,609} - 1$ is an electric prime

Since $2^{43,112,609} - 1$ is the largest known prime, it is not a small prime and so is not an electric prime. If the number of electrons is even, then both premisses are false. If the number of electrons is odd, then the base step is true and the induction step enjoys the characteristic immunity to direct counterexample conferred by vagueness.

I shall now define another predicate that is vague if and only if ‘electric prime’ is precise: a prime is ‘contra-electric’ if and only if
it is small and has parity opposite of the number of electrons. If the number
of electrons is odd, then 2 is the only contra-electric prime. If the number
of electrons is even, then ‘contra-electric’ is as vague as ‘small prime’. If the electric argument is not a sorites, then prefixing ‘contra-’ to ‘electric’ will yield a sorites paradox.

To obtain a borderline case of a ‘vague predicate’, we need only let the parity setter be a vague numeric term such as ‘the number of very acute angle types’. An acute angle is an angle less than 90 degrees. Given that we individuate angles by their integral sizes, there are exactly eighty-nine types of acute angles. 1-degree angles, 2-degree angles, ..., and 89-degree angles. The number of very acute angle types is indefinite. This number is neither definitely odd nor definitely even (although it is definitely either odd or even).

An ‘acute prime’ is a small prime that has the same parity as the number of types of very acute angles. If the number of very acute angles is even, then ‘acute prime’ denotes 2. If the number is odd, then ‘acute prime’ is vague.

If ‘electric prime’ is vague, it is contingently vague (because its vagueness turns on the number of electrons). If ‘acute prime’ is vague, it is necessarily vague.

11. Circuits

‘Same parity as the number of very acute angles’ functions as a switch, turning on vagueness in one epistemically possible scenario, turning it off in the other (though metaphysically, the switch is either always on or always off).

Switches can control other switches. This gives us a scheme for making predicates with second level indeterminacy: define another switch that controls the activation of ‘same parity as the number of very acute angles’ such as ‘same parity as the number of visualizable regular polygons’. Equilateral triangles, squares, and pentagons are visualizable. Chiliagons are not. But it is indefinite which is the last visualizable regular polygon.

An unlimited number of switches can be prefixed to a switch. Therefore, we can engineer successive levels of indeterminacy. As a bonus, we can also proceed laterally, manufacturing higher-order vagueness that will follow the behaviour of logic circuits.

To emphasize that the indeterminacy is the species of indeterminacy underlying vagueness, we can use ‘dimmer’ switches. A dimmer switch
alters how closely the borderline F comes to being a definite F. Although I am only borderline tall, I am closer to being tall than my slightly shorter, but still borderline tall brother. Any precisification of ‘tall’ that makes him tall makes me tall but not vice versa.

Brightening or dimming the switch shows that the relevant kind of indeterminacy is the analog sort that powers the sorites paradox rather than the discrete indeterminacy alleged to arise from future contingents, false presupposition, and quantum indeterminacy. If there are several species of indeterminacy, there should be mixtures of higher-order indeterminacy. The logic of circuits is poised for this contingency.¹

References


¹ Palaeolithic ancestors of this essay roamed the Institute of Philosophy in Prague in 2006. They migrated to the Arché Vagueness Conference at St Andrews, Scotland, in 2007, and were made presentable by the labour of several anonymous referees, two of whom have since been identified to me as Matti Eklund and Robert Williams.