

Vagueness, Ambiguity and Perceptual Bistability

Paul Égré
Institut Jean-Nicod, Paris*

1. Introduction. While vagueness and ambiguity have been opposed in the semantic domain (vagueness is often described as meaning *underdetermination*, ambiguity as meaning *overdetermination*, see Fine 1975; moreover, vagueness is fundamentally a property of *concepts*, ambiguity a property of *stimuli* or *expressions*), Raffman has made the suggestion that within soritical series, borderline cases typically pattern as ambiguous stimuli (Raffman 1994). More precisely, Raffman has put forward the idea that for borderline cases, the instability of our judgements may be akin to the kind of instability we experience in the perception of bistable figures (like the Necker cube, or Jastrow’s duck-rabbit). For instance, Raffman considers a series of color shades making a smooth transition from red to orange and notes that “borderline cases are cases for which looking red and looking orange are very much alike”. One observation she makes is that while the color’s quality appears to change as the judgment flips, there is also a more basic sense in which the stimulus remains constant. Her conclusion is that “such an effect may amount to a kind of Gestalt switch: there is a similar respect in which (for example) the duck-rabbit “looks the same” while yet “looking different” as it species fluctuates” (Raffman 1994: 53).

Though highly suggestive, Raffman’s comparison between the kind of instability experienced in vagueness and the kind of instability experienced with bistable figures has not been an object of close study. In the first part of this paper, I propose to tighten up the connection between vagueness and bistability by undertaking a comparison between sorites series and what I call “Fisher series”, namely series of ambiguous figures gradually altered. In the second part, I discuss two consequences of this analogy. The first concerns the ontology of vagueness and the potential inadequacy of epistemicist accounts (see Williamson 1994); the second concerns the nature of the uncertainty characteristic of vagueness.

2. Fisher series and sorites series. In a series of recent experiments, Lindsey, Brown and Raffman 2005 observe that soritical transitions from one category to another generally give rise to *hysteresis*, namely to the longer persistence of one percept over the other, depending on which category one is coming from. For instance, across and within subjects, the point at which subjects switch their judgment from “red” to “orange” is significantly displaced relative to the point where they switch their judgment from “orange” to “red”. Hysteresis effects suggest that there is a range of cases for which individual judgments can equally go in both directions.

Interestingly, hysteresis effects have been reported independently in the perception of ordered series of bistable figures (see Hock, Kelso and Schöner 1993, Gregson 2004). One actual example I discuss concerns what may be called “Fisher series”, namely series of ambiguous figures whose degree of ambiguity is manipulated in order to favor one percept over the other (Fisher 1967). For instance, Fisher’s “Gypsy and Girl” set of cards comprises 15 cards, each of which represents an alteration of the same ambiguous figure, which can be seen either as representing a Man’s profile (percept A) or as representing a Girl holding a mirror (percept B) (see Fisher 1967, Figure 1). The cards are designed in such a way that card 1 strongly favors the perception of a man’s face, while card 15 strongly favors the perception of a woman’s figure. As in a sorites series, pairwise adjacent cards in the series are hardly discriminable from each other, but each card $n + 1$ is designed to make percept B slightly more salient than percept A relative to card n ; as in a standard sorites, the central cards are those for which competition between the two percepts is maximum (as evidenced

*CNRS-ENS-EHESS, Département d’Etudes Cognitives de l’ENS. Email: paulegre@gmail.com.

from Fisher’s experimental results). A striking feature of Fisher series is that while the relative strength of each percept differs from one card to the other, each card is such that both percepts remain available in principle, even for the end cards.¹ The question addressed in the present paper is whether Fisher series can be used to cast light on the nature of sorites series more generally, and allow us to reassess the relation between vagueness and ambiguity.

3. Scope of the analogy. An obvious objection to the analogy we are making between arbitrary sorites series and Fisher series is that in a series of color shades, for instance, shades are not ambiguous when seen in isolation (unlike Fisher’s figures): individually they give rise to only one percept, whatever its quality. If ever there is ambiguity in such a series, it is contextual rather than intrinsic, and concerns only the *relation* of a given shade to the surrounding shades. We acknowledge this distinction, but the point of the analogy is that series like Fisher’s can in principle be extended on both ends into cards that will eventually have a univocal interpretation. Conversely, given a soritical series of objects o_1, \dots, o_n , such that o_1 is gradually morphed into o_n , and supposing that o_1 prototypically instantiates some category A , while o_n prototypically instantiates some distant and seemingly exclusive category B , our claim is that there will be a range of intermediate cases which ambiguously instantiate both categories A and B . For instance, a prototypical example of a table may be gradually morphed into a prototypical example of a chair: some cases along the series will bear cues that support both conceptualizations. In this regard, the analogy we are making is between Fisher series and the *penumbral area* of an arbitrary sorites series, rather than the whole series.

4. Cut-offs and uncertainty. Granting the analogy, I propose to discuss two consequences thereof. The first is an objection to one construal of epistemicism on which, given a sorites series, and given a concept A that applies to o_1 but not to o_n , there should be an unknowable subject-independent cut-off separating cases that fall under A and cases that do not. In the case of Fisher’s series, however, because both percepts are available all along, albeit to different degrees, inspection suggests that *all cards are legitimate candidates for category shift*, and that *no card mandates a particular shift*. For bistable figures more generally, there is no fact of the matter as to whether they should be perceived one way or the other, given that physically the corresponding stimulus configurations remain invariant. Which percept is first seen depends in part on objective cues, but variations in judgments are to be traced ultimately to perceptual instability on the side of perceiving subjects. More explicitly, the form of our argument is the following:

- (1) a. in the Fisher series, there is no fact of the matter as to whether card n ought to be categorized as a Girl rather than as a non-Girl (Man), since both percepts are available in principle.
- b. One can establish a structural analogy between a Fisher series and the penumbral area of a sorites series.
- c. Therefore, in the penumbral area of a sorites series, there is no fact of the matter as to whether x is to be judged A rather than $\neg A$.

In response to this, an epistemicist may either grant premise b. and argue from the denial of c. to the denial of premise a., or simply deny the value of premise b. Both objections are addressed in turn in the paper. Interestingly though, our account leaves open the possibility that there remain sharp cut-offs between unambiguous and ambiguous cases along the series.

A second consequence concerns the nature of the uncertainty characteristic of vagueness, and the problem of category-shifting. Ambiguous or bistable stimuli are such that one clear percept usually imposes itself, and switching from one percept to the other is difficult (see Hupé & Pressnitzer 2006). Prima facie, the phenomenology of borderline cases is quite different, since for those, no clear category leaps to the fore. However, one possibility is that at bottom, borderline cases are cases for which oscillation between a category A and its complement $\neg A$ happens faster and

¹In Fisher’s original experiment, 7 subjects out of 200 still report a Man’s face as first percept seen on card 15, and 29 out of 200 first see a Woman on card 1. Within-subject experiments would most likely exemplify the same phenomenon.

unconsciously. If indeed borderline cases can be accurately described as ambiguous, the sort of instability found in sorites series may originate in rivalry between overlapping categories, rather than from a gap between them. The question will be addressed of which conception of logic (whether degree-theoretic, paraconsistent or still classical) might best suit the present view of vagueness. One option I will discuss, based on recent work (Égré forthcoming), is to assume that, as in a Fisher series, items of an arbitrary sorites series come with different *potentials* of being represented one way or the other. These potentials can be described by means of prior probabilities, and borderline cases for a category *A* may be characterized as those items for which the corresponding potential lies strictly between 0 and 1. The approach is close to a degree-theoretic treatment, but on the present account, the logic for basic categories may be kept classical provided an adequate theory of judgments based on these potentials can be formulated.

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