



Probability in Hume's Science of Man

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PROBABILITY IN HUME'S SCIENCE OF MAN

This paper is an attempt to make sense of a fragment of Hume's positive philosophy, namely his theory of how we apportion belief on the basis of ambiguous evidence. The topic is one that has received little critical attention from philosophers. One reason for this neglect is the belief that Hume's discussion of probable reasoning is not addressed to philosophical questions, but rather is concerned merely to give a psychological theory of why we tend to make the inferences we do. Another is the view that Hume's psychology of probability is too obscure to merit serious study. I hope to show, however, that Hume's discussion of probable reasoning contains more philosophy, and more interesting psychology, than the prevalence of these attitudes would suggest.

The main philosophical content that I see in Hume's account of probable reasoning is that it embodies a certain theory of belief, worked out in some detail. Here the central notion is the "belief-feeling"¹, vivacity. After an initial discussion of Hume's use of this notion, I hazard the opinion that vivacities are related to probabilities by a simple subtraction formula (§1). The investigation of Hume's account of probable inference (§2) gives strong grounds for thinking that this conjecture is indeed correct. Finally, an examination of what Hume says about the influence of probability on the passions unearths a bold theory of the specific psychological mechanism by which the subtraction of probabilities is effected (§3).

§1 Degrees of belief

Hume's philosophy makes heavy use of the quality of perceptions which he referred to variously as "force", "liveliness", "violence", "vivacity", "strength", "firmness" and so on. As the variety of these terms indicates, Hume was not entirely happy with any of them. He says it is

impossible by words to describe this feeling, which every one must be conscious of in his own breast (A19).² But we need to use some word, and rather than emulate Hume's diverse usage it will be convenient to adhere uniformly to the single term 'vivacity'.

The first use to which Hume puts vivacity is in distinguishing impressions from ideas. Intuitively, impressions are either sensations, passions or emotions, whereas ideas are the perceptions involved in thinking or reasoning. And Hume maintains that we can distinguish these two kinds of perceptions by their differing degrees of vivacity: all impressions have greater vivacity than any idea. Apparently Hume thinks that the difference in vivacity between impressions and ideas is normally quite considerable, although in a few instances there is only a small differential (T2).

Vivacity is again used by Hume to distinguish between belief and conception. Although to have an idea of God, say, is not the same thing as to believe in God, Hume argues that what distinguishes the latter is only the manner of conception. In belief, the idea feels different to an idea that is entertained incredulously. And this difference in feeling is identified by Hume with a difference in vivacity (T96).³

In general, Hume thinks of beliefs as being ideas, not impressions (T86 being an exception). This is the natural view, if one thinks of the distinction between impressions and ideas as a distinction between *feeling and thinking* (T2, A9). What distinguishes beliefs then is a somewhat intermediate vivacity, inferior to the vivacity of an impression but superior to the vivacity of a mere conception.

A third use to which Hume puts vivacity is in making the distinction between memory and other beliefs. Just as beliefs are distinguished from other conceptions by their greater vivacity, so likewise memories are distinguished from other beliefs by *their* greater vivacity (T153).

Each of these three applications of vivacity seems to be implausible. Introspection inevitably suggests that impressions are not always more vivacious or forceful, or whatever, than ideas.⁴ Similarly it seems that our beliefs, and even our memories, are often less vivid than our fancies, contrary to what Hume claims. A considerable part of Hume's appendix to the Treatise is concerned with such objections. Hume appears to allow that what we would naturally call the vivacity of ideas is not a quality which will do what he requires. But he does not abandon the claim that there is a feeling which distinguishes impressions from ideas, beliefs from fancies, and memories from other beliefs. The position Hume retreats to is that the *true and proper name* of this feeling is simply *belief* (T629, E49).

It is true that for Hume beliefs influence passion and action in a way that mere fancies do not. But I do not think that Hume was ever tempted to take this as constituting the essence of belief. Vivacity is the property of our beliefs which causes them to weigh more in the thought, and gives them a superior influence on the passions and imagination (T629, underline added; cf T119). Thus we act on our beliefs because we believe them, and not vice versa.

'Vivacity' should thus be understood as a technical term in Hume's philosophy, referring to whatever feeling it is that distinguishes beliefs from mere fancies. But, it may be objected, this characterization of vivacity trivializes Hume's claim that beliefs are distinguished from fancies by their greater degree of vivacity. For it is certainly trivial that what distinguishes beliefs is belief. On the other hand, one might object that vivacity cannot be identical with belief, since Hume is committed to there being ideas which, though they have some vivacity, are not beliefs. (At T109, in particular, Hume argues that although resemblance and contiguity can impart vivacity to an idea without the assistance of cause and effect, the degree of vivacity so imparted falls short of belief.)

These contrary objections indicate the need to distinguish two senses of 'belief'. The belief which is characterized by a superior degree of vivacity is absolute, not admitting of degrees. To believe in this sense is to be *persuaded of the truth of what we conceive* (T97n). By contrast, belief in the sense in which it is identified with vivacity must be relative, admitting of degrees, and not implying belief in the absolute sense. In order to mark this distinction, I shall restrict the term 'belief' to the absolute sense, and use 'degree of belief' for the relative notion. In this terminology, it is belief that Hume identifies with superior vivacity, and degree of belief that he comes to identify with vivacity. Now these two identifications imply a third, namely that belief is the same thing as a superior degree of belief. This latter identification is far from trivial, and in fact is inconsistent with two other very intuitive principles about beliefs, namely: (1) One should believe the logical consequences of what one believes, and (2) One should not believe a contradiction. The inconsistency is illustrated by the well-known "lottery paradox".

Suppose, for example, that belief is identified with degree of belief greater than 0.9. Now given a fair lottery with 100 tickets, we are justified in having a degree of belief greater than 0.9 that the first ticket will not win, and similarly for all the other tickets. Hence we should believe, of each ticket, that it will not win. But if we conjoin these beliefs, we obtain the conclusion that no ticket will win, which we know to be false. So if belief is identified with a superior degree of belief, we must either deny that beliefs can be conjoined, or allow that contradictions may be believed.

There are obvious similarities between Hume's notion of vivacity and what has come to be known as subjective or personal probability, *i.e.* the interpretation of probabilities as representing a person's degree of belief.

But it seems that the mathematics of vivacity is somewhat different to that of probability. On what appears to me to be the least strained interpretation of Hume, ideas that we regard as no more likely to be true than false have minimal vivacity. This interpretation is suggested by, for instance, the fact that Hume's standard example of ideas lacking vivacity is the *fictions of the imagination* (e.g. E57). For it seems that these fictions, being mere creations of the fancy, need not be actually *disbelieved*. But putting aside the question of whether this interpretation is right or not, let us see what it would imply about the relation between vivacity and probability. To this end, it will be convenient to represent vivacities, like probabilities, on a scale from 0 to 1. That is, a *perfect idea* (T8) has vivacity 0, and the most vivid impression has vivacity 1. We write ' $V(h)$ ' for the vivacity of h , and ' $P(h)$ ' for the probability of h . Then the suggestion I have been making is that $V(h) = 0$ when $P(h) = \frac{1}{2}$. Since vivacities cannot be negative, it seems reasonable to suppose further that $V(h) = 0$ when $P(h) < \frac{1}{2}$. And clearly $V(h) = 1$ just in case $P(h) = 1$. The most natural relationship between vivacity and probability which satisfies these constraints is:

$$V(h) = \begin{cases} P(h) - P(\sim h), & \text{provided } P(h) \geq \frac{1}{2} \\ 0 & \text{otherwise.} \end{cases}^5$$

An equivalent and slightly neater formulation is:

$$V(H) = \max\{P(H) - P(\sim H), 0\}.^6$$

Although this construction is based solely on the (admittedly shaky) consideration that the idea of an equiprobable event has zero vivacity, we shall find that it receives strong confirmation from Hume's discussion of probable reasoning.

§2 Probable reasoning

Laplace is famous for, amongst other things, his definition of probability as the ratio of favourable cases to the total number of equally possible cases. But Leibniz

gave such a definition of probability in 1678.⁷ Hume was evidently familiar with such definitions, taking it for granted that *the likelihood and probability of chances is a superior number of equal chances* (T127).⁸ In *Of the probability of chances* (T124),

The question is, by what means a superior number of equal chances operates upon the mind, and produces belief or assent. (T127)

Hume considers the case of a die with four sides having the same figure, and two sides having another figure. When we consider a throw of the die, we are determined by causal relations to believe that the die will land with one of its sides facing up. But since each side is regarded as equally likely, the vivacity of the original idea becomes divided equally amongst each of the six sides (or rather the ideas of them turning up). The question, however, is what figure will turn up. Hence the sides with the same figure (or their ideas) have their vivacity pooled, so that the figure which appears on four sides has a greater vivacity than that which appears on only two. Assuming that the vivacity of the idea that *some* side will turn up is 1, the vivacity of the ideas of each side turning up is 1/6. Hence after pooling, the idea of one figure turning up is 4/6, and the idea of the other figure turning up is 2/6. At this point, the vivacity of the ideas is the same as their probability. But Hume does not stop there. He says that, since the events are contrary, *the impulses likewise become contrary, and the inferior destroys the superior, as far as its strength goes* (T130). Taken literally, this would seem to mean that the vivacity of the idea of the more numerous figure (4/6) is reduced by 2/6, giving a final vivacity of 2/6. Or symbolically,

$$V(\text{more numerous side}) = 4/6 - 2/6 = 2/6.$$

Notice that this accords exactly with the relationship between vivacity and probability postulated earlier. We have:

$$V(\text{more numerous side}) = P(\text{more numerous side}) - P(\text{less numerous side}).$$

Hume's explanation of reasoning from experience, when we take knowingly into consideration the contrariety of past events (T133), is formally analogous to his account of the probability of chances. The difference is that here experiments take the role that was played by equally likely outcomes in the probability of chances. Hume puts it thus:

Every past experiment may be consider'd as a kind of chance; it being uncertain to us, whether the object will exist conformable to one experiment or another: And for this reason every thing that has been said on the one subject is applicable to both (T135)

For example, suppose we have seen n ships go to sea, and of these have observed $(19/20)n$ return. Then in considering what will happen to a ship which is about to leave port, our certain belief that it will either return or not return is divided into n equal parts corresponding to our n observations. Then as $(19/20)n$ of these observations agree in having the ship return, these pool their vivacity, and similarly with $(1/20)n$ observations that agree in having the ship not return. But since these two views are incompatible, their influence becomes mutually destructive, and the mind is determin'd to the superior only with that force, which remains after subtracting the inferior (T138). Here the explicit reference to subtraction leaves little room for doubting that

$$V(\text{ship returns}) = 19/20 - 1/20 = 9/10$$

$$\text{i.e., } V(\text{ship returns}) = P(\text{ship returns}) - P(\text{ship does not return}).$$

Unfortunately, probable reasoning in real-life situations is much more complicated than the examples we have discussed, and much of it seems not to be amenable to analysis in terms of equiprobable events. This inevitably

has the result that Hume's account of probable reasoning finds little explicit employment elsewhere in his philosophy. The theory is appealed to, however, in the account of hope and fear given in Book II of the Treatise, and in the debunking of miracles in the first Enquiry. We will briefly discuss the latter here, before turning to hope and fear in the following section.

Hume assumes that our evidence for miracles consists entirely of testimony. But our confidence in testimony is, like any other belief about matters of fact, based on experience. We find by experience that the facts generally agree with the reports of witnesses, although this is apt to vary somewhat depending on the circumstances and the nature of the topic. In the case of miracles, Hume argues, the sort of testimony we have is by no means as reliable as it might be. And on the other hand, we have as evidence against miracles that our entire experience of nature tells us that such events do not occur. Having thus characterized the evidence for and against miracles, Hume invokes the principle of the subtraction of probabilities. This principle is stated many times in many ways in the course of the discussion of miracles, but each time the same thing is said:

When...two kinds of experience are contrary, we have nothing to do but subtract the one from the other, and embrace an opinion, either on one side or the other, with that assurance which arises from the remainder (E127).⁹

In the case of miracles, the evidence against is very strong, while the evidence for is rather less than this, with the net result that we should form a judgment against the reality of the miracles.

I initially imputed to Hume the principle of subtraction of probabilities on the basis of a suggestion that equiprobable events have minimal vivacity. But the evidence for the principle of subtraction of probabilities is by now sufficiently strong, that I think we can argue more forcefully in the reverse direction. That is, we can argue that since Hume holds the principle of subtraction of probabilities,

i.e. $V(h) = \max\{P(h) - P(\sim h), 0\}$, therefore he is committed to equiprobable events having minimal vivacity, i.e. $V(h) = 0$ if $P(h) = \frac{1}{2}$.

It remains to say how the subtraction of probabilities occurs, and why Hume thought that it did occur. I shall have something to say about the former after discussing hope and fear in the next section. As for why Hume thought that probabilities were subtracted, no direct evidence is offered for his thesis, Hume claiming only that '*tis evident* the influence of opposite views is mutually destructive (T138). But the *raison d'être* for the subtraction of probabilities is plainly the problem of accounting for how we *extract a single judgment from a contrariety of past events* (T134). In tackling this problem, Hume seems to have assumed that we believe any opinion which is better supported than its contrary (although with a degree of assurance proportioned to the evidence). This is made reasonably clear by the passages from T127, T138 and E127 quoted earlier.

Given this assumption, the problem for Hume is to explain how it is that we believe whatever is more probable than not. And Hume's answer seems to be that when an idea is more probable than its contrary, then by the subtraction of probabilities that idea has positive vivacity, and so is believed (albeit with a degree of confidence proportioned to the vivacity).

There is a difficulty with the last step in this reasoning. It presupposes that all ideas with positive vivacity are beliefs, whence ideas which are not beliefs can only have zero vivacity. Yet as we saw earlier, Hume assumes at T109 that non-belief ideas can differ in vivacity. One might try to obviate this discrepancy in various ways, although my own view is that the discrepancy is a real one. In any event, I shall assume that Hume *does* mean to say that we believe *in a manner* (T127) whatever has probability greater than $\frac{1}{2}$, or positive vivacity.

§3 Subtraction and oscillation

In this section I shall argue that Hume's account of the influence of probable belief on the passions implies a specific psychological model of the subtraction of probabilities. But it will be useful first to consider what Hume has to say about the effect of belief in general on the passions.

Sometimes Hume speaks as if belief has little or no influence on the passions, the major determinant of the passions (and with them the will) being pleasure and pain. Thus he says

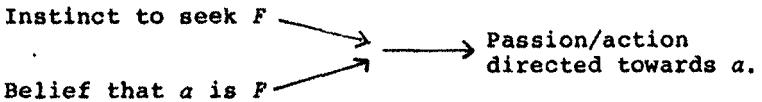
The chief spring or actuating principle of the human mind is pleasure or pain; and when these sensations are remov'd, both from our thought and feeling, we are, in great measure, incapable of passion or action, of desire or volition (T574).

Yet on the other hand Hume clearly does regard belief as an important determinant of the will and the passions, as we noted in §1. Indeed, Hume goes so far as to say that our beliefs are *the governing principles of all our actions* (T629). In order to reconcile these different statements about the determinants of the will and the passions, we must suppose that each is only a partial truth. The question then is how these partial truths fit together, *i.e.* how both pleasure and pain on the one hand, and belief on the other, can influence the will and passions. Hume has little to say on this topic, although we can piece together a view which is plausible, and fits with what he does say.

We may begin with Hume's statement that the mind has an original instinct to unite itself with the good, and to avoid the evil (T438). Then on the following page we find Hume saying:

Besides good and evil, or in other words, pain and pleasure, the direct passions frequently arise from a natural impulse or instinct, which is perfectly unaccountable.

Given the context, it seems clear that Hume means to contrast these "natural impulses", not with pain or pleasure *per se*, but rather with the (similarly natural and unaccountable) *instinct* to seek pleasure and avoid pain. So we may say that in general the direct passions arise from certain natural instincts, among which the instincts to seek pleasure and avoid pain are particularly influential. But an abstract desire for pleasure and the avoidance of pain could hardly produce an action or a passion in itself, without any beliefs as to where pleasure and pain are to be found. Here then is a role for belief to play in passion and action, namely to direct our otherwise blind instincts or impulses. This relationship may be represented diagrammatically thus:



In confirmation of this model, we may note Hume's statement that human nature is *compos'd of two principal parts, which are requisite in all its actions, the affections and understanding, the former being blind without the direction of the latter* (T493). Also the model enables us to make good sense of Hume's talk of passions as *founded on suppositions or beliefs*, and why, when we perceive the falsehood of such a supposition, *our passions yield to our reason without any opposition* (T416).

Turning now to the effect of merely probable belief on passion and action, we might expect that such beliefs would affect the passions in proportion to their vivacity. And this is what Hume does say at T153. Inferior degrees of evidence have, he says, *an influence on the passions and imagination, proportion'd to that degree of force and vivacity, which they communicate to the ideas*. But Hume also holds that probabilities can give rise to *new passions*, namely the passions of hope and fear. This power of probability is explained as follows.

The opposition of contrary chances or causes in probability, Hume now says, has the effect that *the mind is not allow'd to fix on either side, but is incessantly tost from one to another, and at one moment is determin'd to consider an object as existent, and at another moment as the contrary* (T440). While the mind may be turned more often to one side than the other, it cannot settle on either side because of the opposing chances or causes. Now suppose that one side, *h* say, would be a source of joy if it were certain, and *wh* a source of grief. Then the oscillations of the mind between *h* and *wh* alternatively produce the passions of joy and grief. But the passions are *slow and restive* in comparison with the *quick and agile* imagination. (T441) Like the note of a plucked string, the joy from *h* runs on somewhat after the imagination has reverted to *wh*; and similarly with the grief from *wh*. This intermingling of joy and grief Hume sees as the source of hope and fear. Hope is a mixture in which joy predominates, and fear one in which grief predominates.

I have been speaking of the mind oscillating between an idea and its contrary.¹⁰ Hume's discussion, however, seems to consider the oscillation as taking place between the various equiprobable ideas (chances or causes) that for him underlie all probability. Thus Hume speaks of the mixture of the passions in probability as being determined by the *number* of times that the mind is turned to each side of the question (T441), whereas alternation between an idea and its contrary can only result in each side being attended to an equal number of times. Now Hume evidently thinks of the oscillation between the elementary equiprobable ideas as being such that each idea is attended to equally often. This is implied by Hume's discussion of the die, where he says that when the mind thinks of the die being thrown, it considers the ideas of each side turning up *one after another* (T129). But in the case of the die the question was what figure would turn up, and we saw that this had the effect that the vivacities of sides with the same figure were combined.

It is natural to suppose that a parallel phenomenon would occur in connection with mental oscillations. Assuming that the oscillations between equiprobable ideas are of equal duration, the result of the fusing of oscillations would be that oscillations vary in their duration, in proportion to the probability of the idea concerned. In the case of the die, for example, the mind would oscillate between the ideas of the first and second figures turning up, attending $4/6$ of the time to the one and $2/6$ of the time to the other.

At any rate, I take it that the probability of an idea is equal to the proportion of time that the mind attends to the idea. This equality implies another, namely that the vivacity of an idea is equal to the proportion of time the mind attends to that idea, less the proportion of time spent on the contrary idea. And this latter equality suggests the following explanation of the principle of the subtraction of probabilities. We could say, first, that the vivacity of an idea is a feeling whose intensity is proportional to the amount of time that the mind spends considering the idea. This yields vivacities equal to the probabilities. But second, in oscillating between two contrary ideas, the vivacity felt on each side of the question is based on incompatible views. The vivacities will thus be opposed, and tend to annihilate each other; the smaller will be completely destroyed, and the larger reduced by the amount of the smaller. Thus the net result will be a vivacity equal to the difference between the probabilities, as it should be.

This way of accounting for the subtraction of probabilities might also be used to explain why probable beliefs influence the passions in proportion to their vivacity. Suppose for example that h asserts an object a to have some desirable characteristic, and $\sim h$ asserts a to have an undesirable characteristic, and that h is only probable. Then when the mind is considering h there will be a desire for a , and when $\sim h$ is being considered there will be an aversion to a . As before, we can suppose that the intensity of these

passions is proportional to the time devoted to the respective views of the object. And then, since the desire and aversion are opposite passions in relation to the same object, it is not too implausible to suppose that the net result would be a desire (if that were originally the more intense passion), weakened to the extent that it is opposed by aversion. Thus the intensity of a passion founded on h will be proportional to the time the mind spends attending to h , less the time it spends attending to $\sim h$, i.e. it will be proportional to the vivacity of h .

So far this has been put forward as an extension of Hume's theory, rather than an interpretation of it. But I want now to argue that in fact we need to attribute to Hume something like the theory I have been outlining, if we are to reconcile the various strands in Hume's account of the relation between probability and passion. For suppose that I am wrong, and that the passions are proportioned to vivacity directly, rather than via the kind of subtraction process I have sketched. Then since at most one of a set of pairwise incompatible ideas can have positive vivacity, at most one of them can be the foundation of any passion. For example, if h is a source of joy, then it must have positive vivacity, whence $\sim h$ has zero vivacity, from which it follows that $\sim h$ cannot be a source of grief. And so on this hypothesis we can never get that conflict of passions on which Hume's account of hope and fear is based.

If we do attribute to Hume the view that oscillation is the mechanism by which the passions are proportioned to vivacity, it is natural to also attribute to him the related view that oscillation is the mechanism by which probabilities are subtracted. And this attribution has the additional advantage that it resolves a certain disparity between the theory of mental oscillations and Hume's account of probable reasoning. We saw that Hume's account of probable reasoning is directed to explaining our ability to form a single belief on the basis of contrary evidence. Yet it is at least incongruous to on the one hand take for granted our ability to

extract a single judgment from probabilities, and on the other hand to say that the mind cannot fix on merely probable ideas, having rather to oscillate between them. The incongruity disappears, however, when we regard oscillation as the mechanism for the subtraction of probabilities. For on this view a belief is just an idea that, in the process of mental oscillation, is attended to for more than half the time.

My claim, then, is not only that we can view mental oscillation as the psychological mechanism which effects the subtraction of probabilities, but also that the attribution of this theory to Hume is the best way of fitting the doctrine of mental oscillation into the rest of Hume's philosophy. But we might be inclined to write the doctrine of mental oscillations off as an aberration, rather than trying to fit it into Hume's philosophy, if it were to be found only in the single section of the Treatise in which Hume offers his account of hope and fear. This, however, is not the case; the notion that intermediate degrees of belief involve an oscillation of the mind is one that occurs in a number of different contexts, both in the Treatise and the Enquiries. I shall conclude by citing some of these occurrences.

Firstly, on T9, Hume states that fictions of the imagination *cannot without difficulty be preserv'd by the mind steady and uniform for any considerable time*. Similarly, on T109, the principle on which fictions of the imagination are based, namely caprice, is said to be *fluctuating and uncertain*, hence incapable of imparting much vivacity. Then at T134 we are told that contrary experience *presents us with no steady object, but offers us a number of disagreeing images in a certain order and proportion* (cf. T129). And then in his discussion of the passion for truth, Hume says *'tis the nature of doubt to cause a variation in the thought, and transport us suddenly from one idea to another; conversely, the effect of belief is to prevent uneasiness by*

fixing one particular idea in the mind, and keeping it from wavering in the choice of its objects (T453). Turning to Section VI of the first Enquiry, we find Hume saying that when an event has on its side a greater number of chances, the mind is carried more frequently to that event, and meets it oftener, in revolving the various possibilities or chances, while the contrary hypothesis recurs less frequently to the mind (E57; see also E59). When all this is added to Hume's discussion of hope and fear in Treatise II iii 9, I think there can be little question that the theory of mental oscillations is entrenched in Hume's philosophy.¹¹

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1. The term comes from F. P. Ramsey's 'Truth and Probability'. See his *Foundations*, ed. D. H. Mellor (Atlantic Highlands NJ: Humanities Press, 1978) p.71.
2. References to Hume's works are made as follows:
A = *Abstract of a Treatise of Human Nature*, ed. J. M. Keynes and P. Sraffa (London and New York: Cambridge UP, 1938); E = *Enquiry Concerning Human Understanding and Concerning the Principles of Morals*, ed. L. A. Selby-Bigge (Oxford: Clarendon Press, 1975); T = *A Treatise of Human Nature*, ed. L. A. Selby-Bigge (Oxford: Clarendon Press, 1888).
3. Hume retracts this identification at T635, the significance of which will be discussed shortly.
4. This objection is made by Barry Stroud in *Hume* (London: Routledge, 1977) pp. 8f.
5. Check: If $P(h) = 1$, then $V(h) = 1-0 = 1$, and $V(\sim h) = 0$.
If $P(h) = \frac{1}{2}$, then $V(h) = \frac{1}{2}-\frac{1}{2} = 0$, and $V(\sim h) = \frac{1}{2}-\frac{1}{2} = 0$.
If $P(h) = 0$, then $V(h) = 0$, and $V(\sim h) = 1-0 = 1$.
6. $\text{Max}(a,b)$ is defined to be a if $a > b$, otherwise b .
7. See Ian Hacking, *The Emergence of Probability* (London and New York: Cambridge UP, 1975) p.122.
8. That Hume intended to follow standard statistical theory is indicated by his defense of the equiprobability of chances, a doctrine acknowledged by every one, that forms calculations concerning chances (T125).

9. Other statements of the principle are at E111, 112, 113, 114, 116 and 130.
10. The "oscillation" terminology is, of course, somewhat metaphorical. It suggests a picture in which the mind moves to and fro between perduring ideas, whereas the literal truth for Hume would be that the mind has various fleeting ideas in succession.
11. I am grateful to Annette Baier for helpful discussion of an earlier version of this paper.