

Decision and Time from a Humean Point of View

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Abstract

Until recently, little attention has been paid to the consequences of Hume's theory of action upon intertemporal decision. Nonetheless, some of their specificities have been emphasized by G. Davis 2003, A. Lapidus 2000, 2010, and I. Palacios-Huerta 2003. Through recurring discussions, concerning situations of conflicting choice between a close and a remote objective, which run from the *Treatise*, Book 2 (Hume 1739-40), to the second *Enquiry* (Hume 1751) to the *Dissertation* (Hume 1757), intertemporal decision appears, at least for a part of it, as an outcome of the role of the natural relation of contiguity in the formation of a structure of desires, different from the structure of pleasure. This paper shows, and expresses formally, that Hume's approach provides alternative conditions explaining on the one hand time-consistency and, on the other hand, time-inconsistency when the link between contiguity and the violence of the passions is taken into account. The possibility of time-inconsistency is acknowledged by Hume as giving rise to general aversion, therefore constituting a key argument for explaining the origin of government.

Keywords: Hume, intertemporal decision, pleasure, belief, passion, desire, government.

JEL classification: B11, B31, D10.

1 Introduction

Until recently, little attention has been paid to the intertemporal aspects of Hume's theory of action¹. Nonetheless, some of their specificities have been emphasized by Gordon Davis 2003, André Lapidus 2000, pp. 42-9, 2010, and Ignacio Palacios-Huerta 2003. For instance, Davis 2003 and Lapidus 2000, 2010 noticed the link between the violence of the passions and decision in time, whereas Lapidus 2000, 2010 and Palacios-Huerta 2003 made evident to the modern reader the possibility of what is known, since the pioneering work of Robert Strotz (1956), as time-inconsistent decisions. Moreover, Palacios-Huerta clearly showed that the history of intertemporal decision did not begin with that of discounted utility, and interpreted Hume through a hyperbolic discounting model. The reason for this relatively poor interest on this topic seems to come from the rather complex construction within which intertemporal decision takes place.

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¹It is also worth being noticed that Hume's theory of the idea of time (which is not the copy of an original impression) did not receive more attention; on this question, see Oliver Johnson 1989.

From a textual viewpoint, the origin of Hume’s conceptions about decision can be derived from some of his main philosophical works, the *Treatise on Human Nature* (Hume 1739-40), the two *Enquiries* (Hume 1748, 1751) and the *Dissertation on the Passions* (Hume 1757), as an outcome of his theory of passions. Analytically, it might be viewed as the implementation into nowadays recognized as distinct fields (indiscrimination problems, decision in time or in space, decision under risk or uncertainty) of a common pleasure-belief-desire process. At first sight, this looks like a Benthamian approach *ante litteram*, in which pleasure and pain play a leading part. However, it is not. The reason is quite specific to Hume and rests on his theory of knowledge. On the one hand, the determining role of pleasure and pain in the birth of action is, like half a century later, for the author of the *Introduction to the Principles of Morals and Legislation*, beyond all doubts:

Nature has implanted in the human mind a perception of good and evil, or in other words, of pain and pleasure, as the chief spring and moving principle of all its actions (Hume 1739-40, 1.3.10.2, p. 81)².

But on the other hand, as shown by the lines which follow the previous passage, this role is deviated, since pleasure takes place in two strongly separated universes, the one of impressions and the other of ideas, the latter being unable to give rise to action by itself:

[P]ain and pleasure have two ways of making their appearance in the mind; of which the one has effects very different from the other. They may either appear in impression to the actual feeling, or only in idea, as at present when I mention them (Hume 1739-40, 1.3.10.2, p. 81).

As is well known by Hume scholars, belief is introduced as the device which transfers some force and vivacity from pleasure as an impression to pleasure as an idea, in order to make action possible (Hume 1739-40, 1.3.8.2, p. 69). Desire is the resulting impression (an impression of reflection, as Hume puts it; that is, a “passion”, an “affection” or an “emotion”), which expresses this belief and, through the operation of the will, results in action.

This constitutes a two-stage pattern, where pleasure and desire respectively stand for the first and the second stage. Though quite general, this pattern generates some important consequences, from a decision point of view.

1. When interpreting desire and will as, respectively, preference and choice, we have shown (Diaye and Lapidus 2005a) that provided rather general conditions are fulfilled, the decision process leads to rationality in a double sense: *rationality of choice*, since general preferences are such that what is chosen on each element of the domain of choice is always what is preferred; *rationality of preferences*, in that general preferences are both complete and transitive (preference is a preorder).
2. The disconnection between the decisional aspects of choice and their content in terms of pleasure means that we do not necessarily choose what gives us the greatest pleasure. Hume’s approach is built so that it does not entail any particular consequences in terms of rationality, rigorously speaking. However, it brings to the fore the question of the reachability, at least in principle, of a maximum of pleasure position. One of us has emphasized that it led to

²Reference to Hume’s works are given according to the divisions of the editions used in this paper: for the *Treatise* (Hume 1739-40), book, part, section and paragraph numbers; for the two *Enquiries* (Hume 1748 and Hume 1751) and the *Dissertation* (Hume 1757), section and paragraph numbers; and for the *Essays* (Hume 1777), Title of the essay [date of its first publication].

specific welfare policies, aiming at promoting what Hume called “calm passions” (Lapidus 2011), whose central place is also underlined hereafter.

3. The link established by belief between pleasure, as an impression of sensation, and desire, as an impression of reflection, responds to the working of the natural relations of our understanding (“causality”, “contiguity”, and “resemblance”) (Hume 1739-40, 1.1.4, pp. 12-4; 1748, 3.1-3, pp. 101-2) named , so that each of them gives birth to topics that we are used to consider separately (Diaye and Lapidus 2012): (i) though always present, the natural relation of causality, when considered independently, concerns decision under risk or uncertainty; (ii) the natural relation of resemblance deals with indiscrimination problems; (iii) contiguity is linked to decision in space or in time.

In a previous paper (Diaye and Lapidus 2012), we have illustrated this general part played by belief between pleasure and desire with the case of the natural relation of resemblance and indiscrimination problems, showing that a possible intransitivity concerning pleasure can be cancelled by belief when giving rise to desire. Similarly, this paper focuses on intertemporal decision and, therefore, on the natural relation of contiguity³.

Section 2 hereafter proposes a reconstruction of the Humean foundations of decision in time, mainly based on book 2, part 3, sections 7 and 8 of the *Treatise of Human Nature* and on the corresponding passages of the *Dissertation on the Passions*. It first gives the formal characteristics of a function of pleasure as an impression and then accounts for the working of contiguity and belief in order to build an intertemporal desire function, where the desire for an object is all the more closer to the original impression since it is contiguous in time. At this stage, Hume’s approach shares the minimal requirement of the various approaches to intertemporal decision, namely something like a condition of impatience which explains the smaller decision weight attached to remote objects. Yet, it also shows its specificity: the role granted to the emotional state embodied in the degree of violence of the passions, which influences both the pleasure given by an object and the belief in this pleasure, the discount of future objects. The latter varies according to the degree of violence of the passions, the calm passion corresponding to a non-impatience configuration, such that no discount occurs. Section 3 discusses the determinants of intertemporal discounting and shows that Hume’s approach can be viewed as a two-steps procedure, bringing together what Hume called “distance” and “difficulty”. The first step deals with a conception of time “abstractedly considered”, according to Hume’s own words, in which it is easy to recognize a stationarity-like condition. Unsurprisingly, we therefore show that this allows being more specific about the intertemporal desire function, which is of an exponential discounting type, provided the degree of violence of the passion is given. It is obvious that if such was the case, decisions would be time-consistent. This corresponds to a situation in which the possibility of a relation between “distance” and “difficulty” is ignored. Now, the second step of the procedure is based on Hume’s claim that, because of the part played by the natural relation of contiguity, time cannot be “abstractedly considered”, so that difficulty is now explicitly linked to distance. In such case, the dependence of the violence of the passions on the contiguity of an object forbids stationarity and, therefore, exponential discounting, and gives rise to a U-shaped discounting curve which synthesizes Hume’s views on temporal discounting. As argued in the concluding section 4, these views came back to the fore in book 3, part 2, section 7 of the *Treatise*, when Hume discussed

³The natural relation of contiguity is related by Hume to decision in time but also in space (Hume 1739-40, 2.3.7-8, pp. 274-80; 1751, 6.15 pp. 123-4; 1757, 5, pp. 24-5). We will deliberately leave aside what Hume said about spatial decision, in order to focus here on intertemporal decisions.

the acceptability of rules of justice. Justice was described as matching remote interests of the individual, so that its desirability is directly challenged by impatience. On the other hand, since exponential discounting is given up, there is now room for time-inconsistencies, explicitly taken into account. As a result, it is shown that the general aversion against time-inconsistency explains for Hume the support granted to a government whose interest, as far as the observance of the rules of justice is concerned, is to avoid not directly time-inconsistency, but impatient behavior which also results in the cancellation of time-inconsistencies.

2 Pleasure, belief and intertemporal desire: Humean foundations of decision in time

The degree of what Hume called the “violence of the passions” has a dual scope. On one hand, it governs the intensity of pleasure as an impression of sensation. As such, it does not involve any intertemporal considerations. But on the other hand, it also accentuates the decisional effects of the relation of contiguity, decreasing our belief in future pleasures relatively to present ones, thus giving basis to the intertemporal dimension of decision

2.1 Pleasure and the violence of the passions

We have evidence, recalled in a previous paper (see Diaye and Lapidus 2012, pp. 358-364), that Hume had at least some rough intuition of pleasure as a scalar magnitude. Such is the case, for instance, when he argued that

[a] good composition of music and a bottle of good wine equally produce pleasure; and what is more, their goodness is determin'd merely by the pleasure. (Hume 1739-40, 3.1.2, p. 303).

Stated like this, such interpretation might, of course, be discussed: for instance, an important tradition, drawing on Norman Kemp Smith (1941, p. 164), only considered pleasure and pain as efficient causes of action, among others, so that knowing whether they are or not measurable magnitudes wouldn't be that relevant. However, in spite of some qualifications, we will accept hereafter this view of pleasure as a scalar magnitude⁴. And, since Hume distinguishes pleasure strictly speaking, from pain, we consider this magnitude p non-negative ($p \geq 0$) when it concerns pleasure, and negative ($p < 0$) in the case of pain.

An interesting particularity of Hume's approach is that it does not simply entail that our level of pleasure is determined solely by such or such object, let us say x chosen among a set of choice X (assumed to be included in \mathbb{R}_+^n , where n stands for the number of elementary objects). It is obvious, from a Humean point of view, that the objects which presumably provide us pleasure or pain do not exist for us by the sole virtue of our reason and independently of our perceptions (Hume 1739-40, 2.3.3.3, p. 266). They exist for us emotionally, so that the pleasure that we draw from x also depends on the emotional state which governs our ability to feel pleasure. This quality of an emotional state on which the ability to feel pleasure depends is what Hume called the degree of “violence” (Hume 1739-40, II, p. 276) of the passions, which is denoted v hereafter, - v belonging

⁴Considering the existence of indiscrimination problems raised by the working of the natural relation of resemblance, we had argued in Diaye and Lapidus 2012, pp. 367-8 that Hume's treatment of pleasure as a scalar magnitude might have been metaphoric. This led us to represent pleasure as determined not by a *function*, but by a *correspondence*.

to V , which can be any compact in \mathbb{R}_+ . The real-valued function p which determines pleasure can be written as depending on two arguments, the objects of pleasure x , and the degree of violence v of the emotional state which governs our ability to get pleasure from these objects:

$$p : X \times V \rightarrow \mathbb{R}, \tag{1}$$

$$(x, v) \mapsto p = p(x, v)$$

Drawing on the *Treatise* (Hume 1739-40, 1.3.12.24, pp. 96-7; 2.3.4.1-2, pp. 268-9) and some of Hume's *Essays* like the Refinement in the Arts (Hume 1777, Of Refinement in the Arts [1752], pp. 269-70) and the Sceptic (Hume 1777, The Sceptic [1742], p. 167) we have previously introduced and discussed the following properties of the pleasure function p (Diaye and Lapidus 2012, pp. 359 *sqq*):

Monotonicity : (2a)

$$\forall x, y \in X, \text{ if } x \geq y, \text{ then } p(x, v) \geq p(y, v)$$

Maximum with respect to the violence of passions: (2b)

$$\forall x \in X, \operatorname{argmax}_v p(x, v) = \hat{v}$$

where $\hat{v} = \inf (v \in V)$

Cardinality : (2c)

p is cardinal with invariant zero

Concavity relatively to x : (2d)

p is concave with respect to x

The two first properties show that x and v do not influence pleasure in the same way. On the one hand, monotonicity (2a), which concerns the objects of pleasure, does not require particular explanation: if the magnitudes of the components of x and y are conveniently defined, it just means that more provides a pleasure greater than less. It might be illustrated by what Hume says about the consequences of an increase in quantity:

'Tis evident, according to the principles above mention'd, that when an object produces any passion in us, which varies according to the different quantity of the object; I say, 'tis evident, that the passion, properly speaking, is not a simple emotion, but a compounded one, of a great number of weaker passions, deriv'd from a view of each part of the object; for otherwise 'twere impossible the passion shou'd encrease by the encrease of these parts. Thus a man who desires a thousand pound has, in reality, a thousand or more desires, which, uniting together, seem to make only one passion; tho' the composition evidently betrays itself upon every alteration of the object, by the preference he gives to the larger number, if superior only by an unite. (Hume 1739-40, 1.3.12.24, p. 96)

On the other hand, the existence of a maximum relatively to v (2b) independantly of x is not that intuitive, and concerns an important topic of Hume's moral philosophy. This latter grants an eminent role to a specific level of the violence of the passions, which Hume called the "calm passion". From numerous points of view (individual happiness, achievement of justice in the society, public morality, development of the arts, sciences and industry) Hume considered the calm passion as the

most desirable emotional state⁵. This helps to understand the rather strong assumption concerning the calm passion, involved in (2b): Hume admitted that whatever the object of pleasure x that we might encounter, the degree of violence which allows us to draw the greater pleasure from it, is that of a calm passion, denoted \hat{v} (see Lapidus 2011, pp. 219-20). In some cases, Hume acknowledges that a passion could be less than calm - he calls such passion “remiss” in his essay on the Sceptic (Hume 1777, The Sceptic [1742], p. 167). However, this possibility is neglected hereafter, so that \hat{v} in (2b) is the lower bound of V .

Cardinality (with invariant zero) (2c) and concavity (2d) should be dealt with simultaneously, since the last would be meaningless without the first. Both properties can be inferred from a passage of the *Treatise* (Hume 1739-40, 1.3.12.24, pp. 96-7) in which Hume compared the differences of the impressions between two pairs of amounts of money, and concludes that this difference is not as large when the amount of money is high as when it is low (Diaye and Lapidus 2012, pp. 365-66).

2.2 Desire, contiguity, and impatience

Hume carefully distinguishes “the two ways” through which pleasure makes its “appearance in the mind” - as an impression, and as an idea derived from this impression (Hume 1739-40, 1.3.10.2, p. 81). Now, the well-known problem raised by Hume’s theory of action is that whereas impressions can give birth to action, ideas by themselves cannot. The resolution of this difficulty lies in a conception of *belief* as a device which transfers to a simple idea a share of the force and vivacity from the original impression in order to cause action (Hume 1739-40, I, p. 98). Such transfer is performed by what Hume calls the “natural relations” of the mind, *causality*, *resemblance* and *contiguity* (see Hume 1739-40, 1.1.4, pp. 12-4; 1748, 3.1-3, pp. 101-2). We have argued that each of these relations is related to a nowadays distinct topic in decision theory: *decision under risk or uncertainty* for causality, *indiscrimination* for resemblance, and *decision in time or space* for contiguity (Diaye and Lapidus 2012, pp. 376-8).

The most detailed exposition of the latter can be found in book 2, part 3 of the *Treatise*, mainly in sections 7 and 8 devoted to “contiguity and distance in space and time”. Disregarding the issue of space, it appears that through various examples, Hume systematically uses the same approach. Independently of its intention or content, it leads to compare the effects at the present date t_0 of different pleasurable objects which are assumed to be available at various dates situated either in the future ($t > t_0$), in the present ($t = t_0$), or in the past ($t < t_0$). This is the case, for instance, when, at the beginning of section 7, Hume asks his reader “to consider two kinds of objects, the contiguous and remote” (Hume 1739-40, 2.3.7.3, p. 274). Or at the end of section 3, on the occasion of the discussion of the reasons why men often counteract their own interest (Hume 1739-40, 2.3.3.10, p. 268; see also the *Dissertation*, Hume 1757, 5.3-4, pp. 24-5). This corresponds to typical situations where Hume compares, at date t_0 , two objects x (the contiguous) and x' (the remote) respectively available at dates t and t' , such that $t' > t \geq t_0$. In the words of the formalisation used in order to represent pleasure in relation to a set of choice and to the violence of the passion, this means that Hume discusses the perception, at date t_0 , of elements (x, t) of a set of intertemporal choice $X \times T$, where $T = [t_0, +\infty)$ stands for time.

Disregarding the specific influence on belief of the two other natural relations (resemblance and causality), the influence of contiguity makes that insofar as dates t different from t_0 are taken into account, decision can no more be viewed as determined by an impression of pleasure alone (that

⁵See, for instance, Hume 1751, 6.15, p. 123. On the role of the calm passions, see John Immerwahr (1992) and, in relation to individual happiness, Lapidus (2011).

is, by p) but, according to the violence of the passion, by the share of the strength and vivacity of this original impression which is transferred to the idea of a pleasure at date t (the belief in this pleasure) which expresses itself in an emotional state, the desire for goods available at date t . In Hume's words when he discussed the causes of belief,

[...] *when any impression becomes present to us, it not only transports the mind to such ideas as are related to it, but likewise communicates to them a share of its force and vivacity* (Hume 1739-40, 1.3.8.2, p. 69).

This amounts to saying that the desire u for x at date t in an emotional state where the degree of violence of the passion is v might be viewed as a "share" h of the force of the original impression p . Note that since only contiguity matters, h does not depend on x , but only on v and t . And since h is a share, hence belonging to $[0, 1]$, it can be defined as:

$$\begin{aligned} h : V \times T &\rightarrow [0, 1] \\ (v, t) &\mapsto h(v, t) \end{aligned} \tag{3}$$

The resulting function of desire u is therefore:

$$\begin{aligned} u : X \times V \times T &\rightarrow \mathbb{R} \\ (x, v, t) &\mapsto u(x, v, t) \\ \text{where } u(x, v, t) &= h(v, t) p(x, v) \end{aligned} \tag{4}$$

Though quite general, a representation like (4) is familiar to an economist acquainted to the perspective in intertemporal decision opened by P. Fishburn and A. Rubinstein (1982). u looks like an extended intertemporal utility or desire function, which also depends on the emotional state of the individual, expressed by the violence of the passion. Note that u is said "extended", because it allows ordering not only time allocations (x, t) for a given degree of violence of the passion but all possible (x, v, t) , therefore comparing these allocations according to alternative degrees of violence of the passion. Similarly, p looks like an extended standard function of utility, because it depends not only on x , but also on v , just as the share h of the related impression p , looks like an extended time discounting because it depends not only on t , but also on v ⁶.

Hume's comments on the effects of belief in case of intertemporal decision help complement the properties of the discount factor h and of the desire function u . The basic principle comes at the beginning of the section on "contiguity and distance in space and time" (book 2, part 3, section 7), and rests on the understanding of the way our mind deals with remote objects:

'Tis obvious that the imagination can never totally forget the points of space and time in which we are existent; but receives such frequent advertisements of them from the passions and senses, that, however it may turn its attention to foreign and remote objects, it is necessitated every moment to reflect on the present. 'Tis also remarkable, that in the conception of those objects which we regard as real and existent, we take them in their proper order and situation, and never leap from one object to another, which is distant from it, without running over, at least in a cursory manner, all those

⁶Note, also, that the separability of u in (4) relies strongly on the fact that Hume views the belief expressed in h as a *share* of the initial impression given by p . Separability is therefore a primitive of the representation, whereas in usual approach, it is a consequence of some axiomatic property of intertemporal preferences, lighter than stationarity, like Thomsen condition (see axiom A6 and theorem 4 in Fishburn and Rubinstein 1982, pp. 686-7).

objects which are interpos'd betwixt them. When we reflect, therefore, on any object distant from ourselves, we are oblig'd not only to reach it at first by passing thro' all the intermediate space betwixt ourselves and the object, but also to renew our progress every moment, being every moment recall'd to the consideration of ourselves and our present situation. 'Tis easily conceiv'd, that this interruption must weaken the idea, by breaking the action of the mind, and hindering the conception from being so intense and continued, as when we reflect on a nearer object (Hume 1739-40, 2.3.7.2, p. 274).

The conclusion comes straightforward:

The *fewer* steps we make to arrive at the object, Hume said, and the *smoother* the road is, this diminution of vivacity is less sensibly felt, but still may be observ'd more or less in proportion to the degrees of distance and difficulty (Hume 1739-40, 2.3.7.2, p. 274).

From now on, Hume's discussions in sections 7 and 8 devoted to temporal distance have in common the recognition of the loss in force and vivacity of the idea of a remote object, when compared to this of a contiguous object. He distinguishes two mechanisms by which temporal distance decreases the force of the desire for a remote object. On one hand, the degree of "distance" makes h equal to 1 when $t = t_0$, and then decreasing in t . On the other hand, the degree of "difficulty" of the road (or conversely, its smoothness) refers to the depreciation of future goods relatively to present ones, is all the more important since the part played by the natural relation of contiguity is itself important. Whereas the first mechanism is, broadly spoken, rather familiar, the second one is more specific. The part played by contiguity is governed by the degree of violence of the passion, that is by v . A consequence of this approach to the action of the emotional state on the strength of the idea of a future good is an alternative way to understand the calm passion. In one of the most famous passages of the *Treatise* Hume introduces the calm passion as an emotional state in which the relation of contiguity is neutralized, since a remote good is not depreciated:

Men often act knowingly against their interest; for which reason, the view of the greatest possible good does not always influence them. Men often counteract a violent passion in prosecution of their interests and designs; it is not, therefore, the present uneasiness alone which determines them. In general we may observe that both these principles operate on the will; and where they are contrary, that either of them prevails, according to the *general* character or *present* disposition of the person. What we call strength of mind, implies the prevalence of the calm passions above the violent (Hume 1739-40, 2.3.3.10, p. 268).

The calm passion therefore appears not only as the emotional state in which we draw from goods the greatest pleasure: it is also the state in which whatever the "distance" between us and the object which pleases us, the "difficulty" to reach it is so weak that future goods are discounted the less, thus allowing desire to express pleasure without loss of force and vivacity.

Summing up the previous remarks yields to conclude that the share h of the related impression (the discount factor) is decreasing in t and in v ; that when the impression occurs at date t_0 , it is always equal to 1 whatever the violence of the passion; that under a calm passion, it is also equal to 1, whatever the date when the related impression occurs. As a result of each of the previous propositions, the desire function u shows the following properties, assuming for sake of convenience

that $t_0 = 0$ and, therefore, $T = \mathbb{R}^+$:

$$\forall (x, v) \in X \times V \text{ and } s, t \in T, \text{ such that } s \geq t, \text{ then } u(x, v, t) \geq u(x, v, s) \quad (5a)$$

$$\forall (x, t) \in X \times T \text{ and } v, w \in V, \text{ such that } v \geq w, \text{ then } u(x, w, t) \geq u(x, v, t) \quad (5b)$$

$$\forall (x, v) \in X \times V, \text{ then } u(x, v, 0) = p(x, v) \quad (5c)$$

$$\forall (x, t) \in X \times T, \text{ then } u(x, \hat{v}, t) = p(x, \hat{v}) \quad (5d)$$

Note that (5a) is a property of u , playing the same role as the usual axiom of “impatience” which Fishburn and Rubinstein (1982, p. 680) elaborated after, especially, E. von Böhm-Bawerk (1889, pp. 237-59) and T. Koopmans (1960, p. 296) - an axiom whose consequence is that the desire function u is decreasing with time⁷. At this stage, we do not know much more about the behavior of the discount factor and its impact on the intertemporal function of desire. Nonetheless, the calm passion provides an interesting landmark: it leads to conclude that the mere existence of a discounting effect on future goods doesn’t depend on something like the lesser authority of reason, but on a shift of passion from a calm to a violent state.

3 Distance and difficulty: a Humean approach to decision in time

The explanation of the weakening of the desire for future goods in the *Treatise* draws on a metaphoric presentation of the road that we have to cover to reach it: Hume distinguishes the “distance”, that we have related to the time-length between a present moment and a remote object, and the “difficulty”, related to the emotional state (Hume 1739-40, 2.3.7.2, p. 274). Both the distance and the difficulty contribute to the explanation of the reasons why such remote object is not submitted to a desire weaker than the one which would have been felt in case the object was present. Till now, distance and difficulty have been discussed separately, through their respective effect on the share of the original impression and, for difficulty only, on the intensity of the resulting impression of pleasure. Nonetheless, Hume also gave elements to explore their interplay. The operation is performed in two steps which perform a progressive sophistication of intertemporal decision.

3.1 Decision in time “abstractedly considered”: exponential discounting

The first step consists in a cognitive landmark, introduced in the *Treatise* when Hume was discussing the respective effects of past and future intervals in time, which gives impatience some kind of regularity. The starting point is an imaginary experiment:

When, from the present instant, we consider two points of time equally distant in the future and in the past, it is evident that, abstractedly considered, their relation to the present is almost equal. For as the future will some time be present, so the past was once present. If we could, therefore, remove this quality of the imagination, an equal

⁷Hume came again on the consequence of impatience in the third book of the *Treatise*, in order to explain our tendency to injustice: “You have the same propension that I have in favour of what is contiguous above what is remote. You are, therefore, naturally carried to commit acts of injustice as well as me” (Hume 1739-40, 3.2.7.3, p. 343).

distance in the past and in the future would have a similar influence (Hume 1739-40, 2.3.7.9, p. 276).

The way Hume took up this issue is of special interest. When he considered *abstractedly* two intervals in time, he did so with two equal intervals, say $[-t, 0]$ and $[0, t]$. Now, the mental operation (removing a “quality of the imagination”) on which is founded his conclusion that “an equal distance [...] would have a similar influence” is not limited to the comparison between past and future: it is worth not only between a past and a future interval, respectively ending and beginning at date $t_0 = 0$, but between any pair of temporal intervals of equal magnitude, especially between future intervals. Hume suggested himself this possibility of extending his own approach by completing as follows his remark on the comparative influence of past and future intervals, “abstractedly considered”:

Nor is this only true when the fancy remains fixed, and from the present instant surveys the future and the past; but also when it changes its situation, and places us in different periods of time. For as, on the one hand, in supposing ourselves existent in a point of time interposed betwixt the present instant and the future object [...] (Hume 1739-40, 2.3.7.9, p. 276).

Consider therefore two equal intervals of time of length τ , at dates t and t' , and assume (x, v) and (x', v) such that (x, v) at date t is equally desirable as (x', v) at date $t + \tau$. The “similar influence” argument leads to conclude that this equal desirability still holds for the respective dates t' and $t' + \tau$. More formally,

$$\begin{aligned} \forall (x, v), (x', v) \in X \times V, \text{ and } t, t + \tau, t', t' + \tau \in T, \\ u(x, v, t) = u(x', v, t + \tau) \Rightarrow u(x, v, t') = u(x', v, t' + \tau) \end{aligned} \quad (5e)$$

It is easy to recognize in (5e) a transposition of the axiom of stationarity (see Fishburn and Rubinstein 1982, p. 680). This leads to conclude that decision in time “abstractedly considered”, can be represented by a desire function u which shows the usual characteristics of an exponential discounted utility function (see Appendix) in which $h(v, t) = \delta(v)^t$ so that it can be written:

$$\begin{aligned} u(x, v, t) = \delta(v)^t p(x, v) \\ (\text{where } 0 \leq \delta(v) \leq 1) \end{aligned} \quad (6)$$

For any given “difficulty” (in Hume’s words) - that is, for any given value of the degree of violence of the passion v - the desire function in (6) shares the properties of a standard exponential discounted utility function. In particular, the discount factor $\delta(v)$, decreasing in the difficulty v , can be viewed as fixed for any given v , and related to a non negative discount rate $r = \frac{1}{\delta(v)} - 1$, also depending on v . The resulting curves of time discounting $h = \delta(v_i)^t$ are represented in figure 1, each of them depending on a degree of violence of the passion $v_1 > v_2 > \dots > \hat{v}$.

It is well-known that, owing to a stationarity property like (5e), exponential discounting is (statically) time-consistent, which means that as long as our emotional state expressed by v_i remains stable, if x at date t_1 is less desired than y at date $t_1 + s$, the order of preference is preserved for any other date t_2 , provided the time distance between x and y remains s . From a Humean point of view, this means that if our intertemporal desires were shaped in this way, “abstractedly considered”, if our tastes (say, the pleasure function p) and our emotional state (the

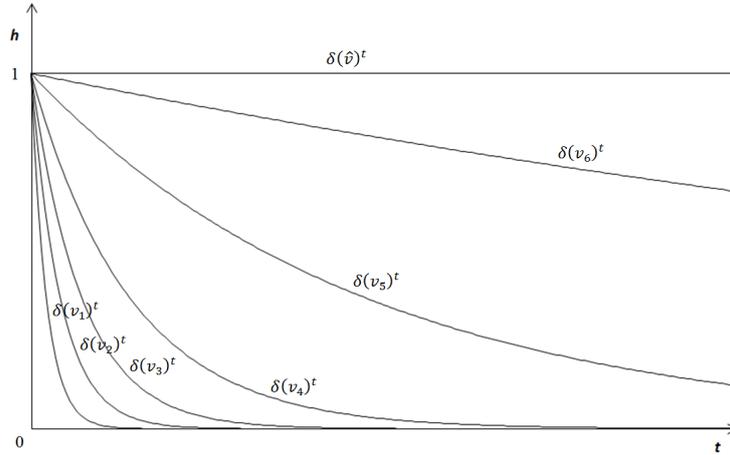


Figure 1: Time discounting “abstractedly considered”: exponential discounting $h = \delta(v_i)^t$
 $v_1 = 1.1$; $v_2 = 0.9$; $v_3 = 0.7$; $v_4 = 0.5$; $v_5 = 0.3$; $v_6 = 0.22$; $\hat{v} = 0.2$; $\delta(v_i) = 1 + b - v_i$ ($b = 0.2$)
 $\delta(v_1) = 0.1$; $\delta(v_2) = 0.3$; $\delta(v_3) = 0.5$; $\delta(v_4) = 0.7$; $\delta(v_5) = 0.9$; $\delta(v_6) = 0.98$; $\delta(\hat{v}) = 1$

difficulty, or the degree of violence v) do not depend on time (that is, are time-invariant), any commitment based on intertemporal desires can be viewed as credible, since it has no reason to be modified with the passing of time. However, even if one admits that p is time-invariant, such conclusion is restricted to the case where v is unchanged. Variations in v open the path to the possible occurrence of static (when the agent remains at the same moment in time, and considers future and close outcomes) as well as dynamic (when the agent moves to future outcomes, making them closer) time-inconsistency, though such apparent inconsistency is easily explained by the separate modifications of the agent’s emotional state. To such an extent that it should more properly be viewed as an expression of a change in tastes, than as a lack of consistency.

3.2 U-shape Humean discounting and the issue of time consistency

When Hume dealt with decision in time “abstractedly considered”, he viewed “difficulty”, the degree of violence of the passions, as an independent magnitude which influences the magnitude of both the impression of pleasure and the associated belief, represented by a discount factor. The second step of the reconstruction leads to give up this abstract consideration in order to favour not every kind of influence on the violence of the passions, but only the one which is conveyed by the natural flow of time, that is the effect on “difficulty” of the decrease of “distance”.

Even before his developments on contiguity and distance, Hume had emphasized the influence of the date of a future event on the violence of the passions when he was arguing that “the same good, when near, will cause a violent passion, which, when remote, produces only a calm one” (Hume 1739-40, 2.3.4.1, p. 269). In different words, the same idea also appears in the second *Enquiry* (Hume 1751, 6.15, p. 123) and in the *Dissertation* (Hume 1757, 5.3, p. 24), this of (i) an increase in the degree of violence of the passion when the date of availability of the previously remote object approaches; and on the contrary of (ii) a calm passion, which imposes itself when the object is distant enough. This last feature is given more details when in book 3 of the *Treatise* Hume draws on this analysis of the effect of time upon the violence of passions, in order to account for such matters as the origin of the observance of the rules of justice, stressing that when they concern a remote enough future, our desires lead us toward what pleases us the most, that is, to what is conveyed by a calm passion:

When we consider any objects at a distance, all their minute distinctions vanish, and we always give the preference to whatever is in itself preferable [*i.e.*, is providing the greatest pleasure; M.A.D. and A.L.], without considering its situation and circumstances. [...] In reflecting on any action which I am to perform a twelvemonth hence, I always resolve to prefer the greater good [*i.e.*, the greater pleasure (see Hume 1739-40, 1.3.10.2, p. 81; 2.3.9.8, p. 281); M.A.D. and A.L.], whether at that time it will be more contiguous or remote; nor does any difference in that particular make a difference in my present intentions and resolutions. My distance from the final determination makes all those minute differences vanish, nor am I affected by any thing but the general and more discernible qualities of good and evil [*i.e.*, of pleasure and pain; M.A.D. and A.L.] (Hume 1739-40, 3.2.7.5, pp. 343-4).

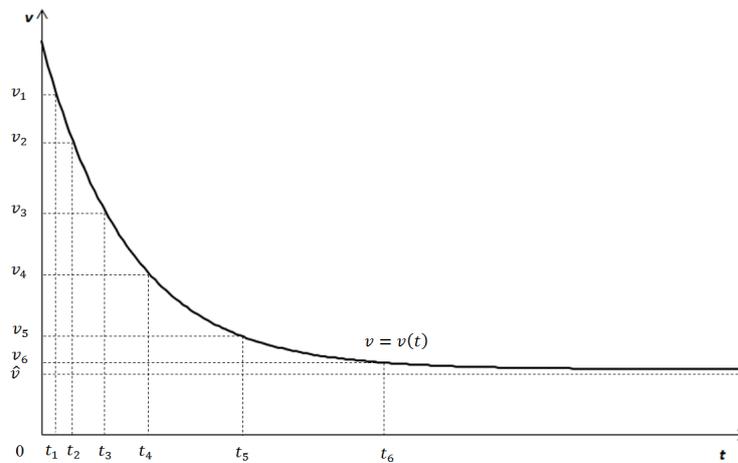


Figure 2: Time and degree of violence of the passion

$$v = \frac{1}{a^t} + b; a = 1.5; b = 0.2$$

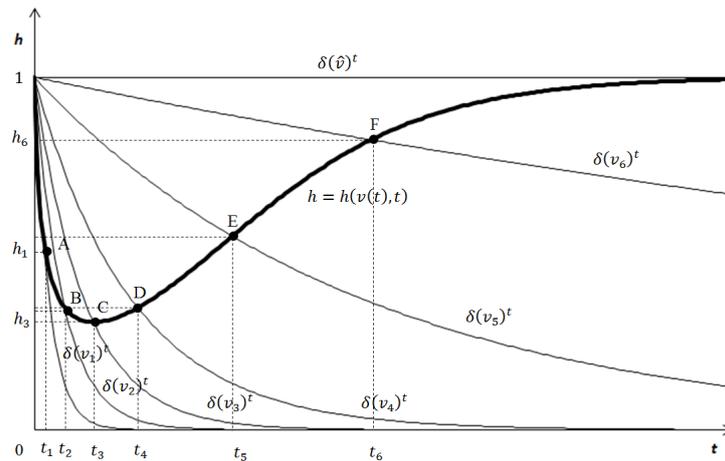


Figure 3: The relation between Humean and exponential discountings

$$h = (1 + b - v(t))^t = \left(1 - \frac{1}{a^t}\right)^t; a = 1.5; b = 0.2$$

This suggests that when we start from an initial situation where the date of availability of objects of choice is remote enough we come to consider them from an emotionally calm viewpoint,

figured by a value of v equal to \hat{v} , thus allowing our beliefs to convey the whole force and vivacity of the associated impression of pleasure, which is itself as high as possible, again since it is the way we live it under a calm passion. But when t becomes smaller (like in figure 2, when t decreases first to t_6 , and then to t_5, t_4, \dots), v begins to increase (from \hat{v} to v_6, v_5, \dots), till the moment when $t = 0$ where it reaches its maximum. More formally, this amounts to complementing the previous representation of h and p by expliciting time as a determinant of the violence of the passions,

$$\begin{aligned} v : T &\rightarrow V & (7) \\ t &\mapsto v(t) \\ \text{with } v(0) &\geq \hat{v}, \frac{\partial v}{\partial t} \leq 0 \text{ and } \lim_{t \rightarrow +\infty} v(t) = \hat{v} \end{aligned}$$

From (6) and (7), it becomes now possible to build a non-extended intertemporal desire function, given by $w(x, t)$, depending only on x and t and where v is not an argument:

$$w(x, t) = u(x, v(t), t) = \delta(v(t))^t p(x, v(t)) \quad (8)$$

Figures 2 and 3 respectively show the effect of time on the degree of violence of the passion, and the overall result on discounting, given by the U-shape of $h(v(t), t)$, when v is no more considered as an independent variable but, according to (7), as depending on t . Figure 3, which provides a representation of Humean discounting according to (8), is especially significant since although it meets the nowadays usual idea of diminishing impatience, it is also related to the diminishing degree of violence of the passions. Consider, for instance, what Hume would have called two “contiguous” objects, whose date of availability is given by the abscissae of points A and B. The closer to the present time, A, appears more discounted at date t_1 than it would have been on the basis of the exponential discount and the degree of violence of the passion which prevails for the more distant, B, at date t_2 - that is, if it had been “abstractedly considered” according to a degree of violence $v_2 < v_1$. This provides an argument in favour of Palacios-Huerta (2003) claim that Hume’s (and Smith’s) discounting embodies a hyperbolic or quasi-hyperbolic structure. But later on, after C, the slope of the Humean discounting curve becomes positive, so that when moving to D, E, and F, it approaches the ordinate $h = 1$. Hence, when objects are remote enough, they do not suffer any more significant discounting and our preferences are consistent with the order of the highest pleasures (under a calm passion) that we can draw from them.

Time inconsistency is an obvious consequence of the opposite movement of distance and difficulty (t and v) in Humean discounting. Again in book 3 of the *Treatise*, the previous quotation continues as follows, showing that Hume was clearly aware of the nature of the problem he raised:

But on my nearer approach, those circumstances which I at first overlooked begin to appear, and have an influence on my conduct and affections. A new inclination to the present good springs up, and makes it difficult for me to adhere inflexibly to my first purpose and resolution. (Hume 1739-40, 3.2.7.5, p. 344).

Assume that the date of availability and the discounting of x are given by the coordinates of F in figure 3, and that y is available later, say at $t_6 + s$, so that y is preferred to x . What Hume is arguing is that when we are nearer to x and y , for instance when the date of availability and the discounting of x have moved to the coordinates of A, the date of availability of y being now $t_1 + s$, the discounting of future objects like y might have been so high that preference between x and y

is inverted, and x has become the most desired⁸.

4 Concluding remarks: Government, as a remedy to impatience and time inconsistency

The properties granted to the calm passion are at the origin of Hume's assessment of decision in time, particularly to his awareness of the negative consequences of what we have called impatience. The calm passion has been related to its social, religious and political effects (see Immerwahr 1992). But it is also related to its individual effects on decision and welfare (Lapidus 2010, 2011): it drives us to what pleases us the most and, moreover, it places us in the emotional state where our choices give us the greatest pleasure. So that what seems to have puzzled Hume the most is less that our choices might be time-inconsistent, than that they take us away from those that a calm passion would have pointed out. In other words, it means that the problem is *impatience* (5a), from which discount of future objects is derived, more than the possible transgression of *stationarity* (condition (5e) not fulfilled), which allows time-inconsistency:

There is no quality in human nature, which causes more fatal errors in our conduct, Hume says, than that which leads us to prefer whatever is present to the distant and remote, and makes us desire objects more according to their situation [present or remote; M.-A. D. and A.L.] than their intrinsic value [the pleasure they produce; M.-A. D. and A.L.]. (Hume 1739-40, 3.2.8.8, p. 345; see also Hume 1751, 4.1, p. 99)

Assuming the problem is impatience is far from self-evident. Within the typical opposition between a full acceptance of impatience and the idea that it should better be cured, Hume would be clearly on the side of the latter. In other words, he would be on the side of John Rawls (1971, pp. 259-62), for whom impatience should be avoided on the basis of an impartial concern for all parts of our life, but not of Derek Parfit (1971, p. 99), for whom impatience is all the more so admissible since it results from the separation between a present and a future self. Or on the side of the early Anglo-Saxon marginalist tradition which goes from Jevons to Marshall, Fisher and Pigou (see Sandra Peart (2000)), to which might easily be added such authors as Rae or Böhm-Bawerk, and which considers impatience as some kind of mental weakness or deficiency.

Hume's position about impatience is quite general in its scope, since it covers every aspects of decision, insofar as it has an intertemporal dimension. It accounts for both individual strategies which result in a tranquillization of the passion, and the promotion of the calm passion through public policies. The modalities of these strategies and policies were introduced mainly in some of the *Essays* which Hume gathered from the 1740's till his death (Hume 1777), like *The Sceptic* (1742), *the Delicacy of Taste and Passion* (1741) and *the Refinement in the Arts* (1752) (see Lapidus 2011). Yet, it also brings up a more specific issue, which Hume considers to be the most serious consequence of impatience - the faulty observance of the rules of justice on which life in society depends. As Hume puts it:

This [preference granted to the present; M.-A. D. and A.L.] is the reason why men so often act in contradiction to their known interest [their greatest pleasure; M.-A. D. and A.L.]; and, in particular, why they prefer any trivial advantage that is present,

⁸We have interpreted Hume's position as amounting to the recognition of *static* time-inconsistency. But his vocabulary ("on my nearer approach") also suggests the possibility of *dynamic* time-inconsistency.

to the maintenance of order in society, which so much depends on the observance of justice. (Hume 1739-40, 3.2.7.3, p. 343).

But the subtlety of Hume's approach rests on a distinction between what is painful to him, as a philosopher interested in the well-being of mankind, and what is perceived as immediately painful to the individual concerned, which shows decisional effects. Whereas the first one depends on the universality of time discounting, thus on impatience, the second rests on time inconsistency, thus on non-stationarity. On the whole, the part played by intertemporal decision in Hume's section of the *Treatise* on the origin of the government has been brought out in Hume's scholarship, though the issues raised by impatience haven't been clearly distinguished from those raised by non-stationarity.

For instance, John L. Mackie drew on two kinds of arguments. In the first one, we recognize impatience: "human beings have a deplorable tendency to prefer smaller immediate advantages to greater remote ones" (Mackie 1980, pp.106-7). The second argument, explicitly related to Hobbes, amounts to the sub-optimality of the equilibrium of a non-cooperative game: "if I know that you are liable to do this, I cannot rely on your conformity, even if I conform; and then it will not after all be even in my long-term interest to conform" (Mackie 1980, p. 107; note, however, that such is not necessarily the case if the game is repeated). Annette Baier also focused on the part played by impatience in presenting government as a means "to make what is in our long-term interest also in our short-term interest" (Baier 1991, p. 255). But here again, the specificity of non-stationarity and the related time-inconsistency were ignored. Rachel Cohon also emphasized the role of impatience, which she called "temporal myopia" (Cohon 2008, p. 219). But she should be acknowledged for her intuition of time-inconsistency. Using a different vocabulary, she views it as a particular case of impatience, that is as a "further feature of temporal myopia [which] helps them [the individuals] consent to future constraints for the sake of gain in the more distant future" (Cohon 2008, p. 220). This leads her to conclude that "[b]ecause of their general 'negligence about remote objects', they do not react to the intervals between separate events when both events are far enough in the future; they attend only to the relative magnitude of the goods to be produced", and to identify this "further feature" as the source of the consent of the people to the action of a government which leads us to choose what fulfils our long term interests (Cohon 2008, p. 220; see also p. 221).

Now, the distinction between impatience and time-consistency is crucial. As individuals, we can put up with impatience, in spite of the aversion of a philosopher against such a universal weakness: we do not really suffer from the discount placed on future pleasures, at least when the discounting procedure is time-consistent. But when it is time-inconsistent, we cannot put up with it: we suffer from the modification of our preferences when nothing else happens than the passage of time, and when we know this,

[t]ho' we may be fully convinc'd that the latter object [the remote] excels the former [the contiguous], we are not able to regulate our actions by this judgment, but yield to the solicitations of our passions, which always plead in favour of whatever is near and contiguous. (Hume 1739-40, 3.2.7.2, p. 343)

Hume describes this situation as a "weakness" to which "all men are, in some degree, subject" (Hume 1739-40, 3.2.7.3, p. 343). Not only will our preferences change when moving from t_0 to t_1 , but we are also fully aware, in t_0 of this change which is to take place in t_1 . So that we are prone, in t_0 , to search for a remedy to the imposition of future choices which do not fit our present

preferences. On first view (“a cursory view”, Hume says), this seems insoluble, and Hume was clearly conscious of the logical trap:

This quality [preference given to the most contiguous] [...] also seems, on a cursory view, to be incapable of any remedy. The remedy can only come from the consent of men; and if men be incapable of themselves to prefer remote to contiguous, they will never consent to any thing which would oblige them to such a choice, and contradict, in so sensible a manner, their natural principles and propensities. (Hume 1739-40, 3.2.7.4, p. 343).

He depicts our repeated and inefficient attempts to find a solution in order to cure such “natural infirmity”: “I may have recourse to study and reflection within myself; to the advice of friends; to frequent meditation, and repeated resolution” (Hume 1739-40, 3.2.7.5, p. 344). And at last, he presented an implementable solution, in which it is easy to recognize a standard solution, (actually, an *external constraint* which Hume called “a restraint upon myself”) to a multiple-self problem of the type Ulysses and the Sirens (J. Elster 1977):

And having experienced how ineffectual all these are, I may embrace with pleasure any other expedient by which I may impose a restraint upon myself, and guard against this weakness. (Hume 1739-40, 3.2.7.5, p. 344).

This “other expedient” is well-known: it consists in transferring today the realization of our future choices to people whose short-term interest concerns these future choices that we know we would not support anymore tomorrow. Hume’s argument is worth being quoted at length, since it opens the path to its explanation of the origin of government⁹:

The only difficulty, therefore, is to find out this expedient, by which men cure their natural weakness, and lay themselves under the necessity of observing the laws of justice and equity, notwithstanding their violent propension to prefer contiguous to remote. It is evident such a remedy can never be effectual without correcting this propensity; and as it is impossible to change or correct any thing material in our nature, the utmost we can do is to change our circumstances and situation, and render the observance of the laws of justice our nearest interest, and their violation our most remote. But this being impracticable with respect to all mankind, it can only take place with respect to a few, whom we thus immediately interest in the execution of justice. These are the persons whom we call civil magistrates, kings and their ministers, our governors and rulers, who, being indifferent persons to the greatest part of the state, have no interest, or but a remote one, in any act of injustice; and, being satisfied with their present condition, and with their part in society, have an immediate interest in every execution of justice, which is so necessary to the upholding of society. Here, then, is the origin of civil government and society. Men are not able radically to cure, either in themselves

⁹It is usually argued that Hume modified his position between his early developments on “the origin of government” in book 3, part 2, section 7 of the *Treatise* and the last essay he wrote, under the same title, in 1774 (Hume 1777, pp. 37-41). See, for instance, Knud Haakonssen (2009, p. 355), who suggested that in the *Essays*, at the difference from the *Treatise*, Hume concluded that the habit of submission during the time of war bore the main responsibility in the origin of government. Yet, in this short essay, Hume confirmed the part played by impatience, though in less details than in the *Treatise* and without fully completing his argument (note, however, that the essay is less than five pages length): “But much more frequently, he [man] is seduced from his great and important, but distant interests, by the allurements of present, though often very frivolous temptations. This great weakness is incurable in human nature” (Hume 1777, Of the Origin of Government [1774], p. 38).

or others, that narrowness of soul which makes them prefer the present to the remote. They cannot change their natures. All they can do is to change their situation, and render the observance of justice the immediate interest of some particular persons, and its violation their more remote. These persons, then, are not only induced to observe those rules in their own conduct, but also to constrain others to a like regularity, and enforce the dictates of equity through the whole society. (Hume 1739-40, 3.2.7.6, p. 344; see also 3.2.10.2, pp. 354-5)

Hume’s argument is brilliant. As individuals, we do not have special aversion against impatience, but we do have aversion against time-inconsistency. This might have invited us to support a government constituted by possibly impatient people, provided they are time-consistent, which would be surely the case if they consider “abstractedly” the time within which they make decisions. Now, such impatient people, able to consider time “abstractedly”, simply do not exist: the “natural infirmity” which gives a lesser importance to remote objects is all the more universal since it rests on the natural relation of contiguity which also makes the violence of the passion decrease with the delay before the availability of the remote object, thus producing time-inconsistency. So that we cannot avoid supporting, as our governors, people who are, like everybody, more or less submitted to impatience, but provided their immediate interest is that we do not decide according to the comparatively lesser importance that we grant to a remote object. If we are led for this reason to keep our decisions unchanged in spite of the passing of time, we behave as if we were under the influence of a calm passion. In some issues crucial to social life like the observance of rules of justice, this means that though searching only for the cancellation of time-inconsistency, we give birth to an institutional device which keeps us within the path that a calm passion would have marked out.

Appendix: Decision in time “abstractedly considered”

Proposition. *Let u denote a desire function $X \times V \times T \rightarrow \mathbb{R}$ such that, like in (4), $u(x, v, t) = h(v, t)p(x, v)$, with p and h respectively defined by (1) and (3). Assuming (2a)-(2d) and (5a)-(5e), then*

$$u(x, v, t) = \delta(v)^t p(x, v)$$

(where $0 \leq \delta(v) \leq 1$)

Proof. Let us state $u_v(x, t)$ the function derived from u by considering v as fixed. It writes according to theorem 2 of Fishburn and Rubinstein (1982, p. 682), $u_v(x, t) = \delta_v^t f_v(x)$ with $0 \leq \delta_v^t \leq 1$ and f_v is an increasing function of x . δ_v and f_v depend on v because u_v is a parametrized function (by v). As a consequence, by varying the value of v , we get $\delta_v = \delta(v)$ and $f_v(x) = f(x, v)$. Remind however that $u(x, v, t) = h(v, t)p(x, v)$, with $0 \leq h(v, t) \leq 1$ and p is an increasing function of x . Then by identification, we get $h(v, t) = \delta(v)^t$ and $f(x, v) = p(x, v)$. u therefore adopts the typical form of an exponential discounted utility function, $u(x, v, t) = \delta(v)^t p(x, v)$. \square

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