

LEIBNIZ ON THE PRINCIPLE OF TRANSITION

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Arthur Lovejoy's masterful, highly influential interpretation of Leibniz's philosophy has been almost neglected for decades now. This paper tries to rehabilitate Lovejoy's construal (with a number of adaptations) by delving into the underlying logical links connecting Leibniz's principles of order and gradation (the latter also called 'law of continuity', 'principle of transition' or 'principle of the jumpless change': *natura non facit saltus*) with other fundamental principles of his mature philosophy.

Leibniz's principle of order, **PO**, claims that each mapping is such that, whenever the inputs (the functional arguments) become closer, so do the outputs (the values). (Which, by the way, does not rule out an inversion of the sense, provided the condition of monotonicity is respected.) *Datis ordinatis, etiam quæsitæ sunt ordinata*. To put it with symbolical notation, what **PO** says is that, $\lceil \forall f \forall xyz ([z < x < y] \rightarrow ([fz < fx < fy] \vee [fy < fx < fz])) \rceil$.

Leibniz thinks that **PO** implies the principle of continuity, or **PC** for short, which requires that each transition should be made through intermediary steps: to any small difference of degree as regards the *data* or the hypotheses, there must correspond a correlativity small difference of degree as regards the results. In other words, jumps are ruled out.

However we can doubt that such an implication really holds. Suppose that, for $x < 1/2$, $f(x) = x$ but that, for $x \geq 1/2$, $f(x) = (x + 1/2)$. Such a function, f , is order-preserving and complies with **PO**. It is clearly non-continuous, though. Thus, besides the fact that **PO** can be also realized in a non-dense series of cases (e.g. the function mapping integers into their squares), **PO** alone is not proved to imply **PC**, even for functions whose set or arguments is dense. **PC** is stronger.

However, most often we seem entitled to take — in a rough or loose way — **PO** and **PC** to express the same idea, or at least closely related ideas. Leibniz never came upon a sufficiently adequate formulation of **PC**. His philosophical view of **PC** seems to have been some sort of combination of **PC** and **PO**.

Of course nowadays mathematicians have introduced a number of meticulous distinctions and classifications; thus, several concepts Leibniz takes to be equivalent are now demarcated from one another. Monotonicity, continuity, derivability are now different notions endowed with clear-cut, crisp definitions, whereas Leibniz frequently runs them together — which he may be entitled to do under customary assumptions and for a broad range of cases. However, those mathematical niceties are but of secondary relevance to our purpose in this paper, which is to inquire into the philosophical significance and defendability of Leibniz's views on continuity.

————— I —————

Leibniz views both principles as necessarily obtaining not just in the realm of truths of fact but also in that of verities of reason (even though a number of interpreters have tended to confine those principles to the former domain), as is evinced by his insistence upon the

mathematical (esp geometrical) validity of those principles. (See e.g. the Letter «Sun un principe général», [GP], t. IV, pp. 51ff: ‘[ce principe de l’ordre général] a son origine de l’infini, il est absolument nécessaire dans la géométrie’; see, too, «Principium quoddam generale non in mathematicis tantum sed et physicis utile», [GM], t. VI, pp. 129ff: ‘Cum differentia duorum casuum infra omnem quantitatem datam diminui potest in datis siue positis, necesse est ut simul diminuatur infra omnem quantitatem in quæsitis siue consequentibus quæ ex positis resultant’: this is a reasonably clear formulation of **PC**.)

Even if Leibniz sometimes calls **PC** ‘an architectonic principle’ (thus in the *Tentamen Anagogicum*), he does not confine it to this world or to any particular set of contingent worlds. Quite the opposite, Leibniz is deeply worried by the existence of apparent counterexamples to the principle, such as mathematical functions which are discontinuous. Thus, in *Opuscules et fragments inédits*, ed. by Couturat, p. 581, Leibniz is concerned over functions wherein ‘Nihilum, Unitas et Infinitum sese consequuntur, nullo interposito’, which would not matter at all should **PC** — as several interpreters adduce — be a contingent law ruling over some special kind of possible worlds only.

That **PC** is a necessary truth reigning over the whole space of possible worlds — and not a contingent law ruling over certain particular possible worlds such as ours — is clearly explained by Yvon Belaval (*Leibniz critique de Descartes*, Paris: Gallimard, 1960, pp. 404-5): ‘Ce principe de l’ordre général est absolument nécessaire, comme en géométrie, car il règne sur tous les mondes, ensembles de monades compossibles, c’est-à-dire qui s’entr’expriment intégralement [...] mais la manière dont il se réalise en un monde est particulière, contingente [...]’.

II

Leibniz’s gradualism finds its main realization in **PC** according to which nature makes no jumps, i.e. no small increase in the input yields a sudden, abrupt boost in the output. The short of **PC** is an idea of proportion or commensurateness to the effect that any similarity or nearness between two inputs needs to be mirrored by a similarity or nearness between the two corresponding outputs. This is what ‘Continuity’ is taken to be: the exclusion of jumps.

What (around 1686) led Leibniz to espouse **PC** was **PSR** — the principle of sufficient reason. Leibniz’s (not always explicit) argument can be put as follows. Let us take a function carrying arguments of a kind X into values of a kind Z, but such that the only feature it takes into account, as regards members of X, is a certain property P. Now suppose there are two members of X which, relevantly, differ only in a small degree of P-ness. The corresponding values, i.e. two members of set Z, must be close to each other as regards the relevant property, Q, or else the mapping in question is not one taking into account only [degrees of] P-ness. Thus, **PSR** entails **PC**.

A different sort of (often merely implicit) argument adduces that any function in breach of **PC** would introduce some arbitrariness or other. If, all of a sudden, a jump occurs at a certain point, why not before or afterwards? Why exactly that jump instead of a larger or a smaller one?

The Leibnizian derivation of the rejection of jumps — or interruptions — from **PSR** is also sketched out in a number of places. Thus the famous letter to Varignon (1702) clearly explains the idea: since everything is thoroughly interconnected, no single instance can be adduced of any property suddenly vanishing or arising without an intermediate transition formed by a set of inflection-points which render the change explicable.

 III

Leibniz carries his espousal of **PC** so far that he even commits himself to the view that all differences are merely variations of degree. A purely qualitative difference would mean a cleavage, a shift from 0 to 1, or the other way round, without any intermediate steps — hence a jump, i.e. a mutation which cannot be accounted for in terms of underlying small changes (such as the flow of time).

Essential differences — which at first sight may seem to be chasms of incommensurable discrepancy — are, when carefully scrutinized, shown to be only quantitative increases of a certain underlying property which comes in degrees.

The already mentioned 1702 letter to Varignon contains a quite clear development of the idea that all kind classifications can be reduced to gradations and thus, in virtue of **PC**, any small increase in the series of causes is bound to bring about only a correlatively small increase in the series of effects. Which would be ruled out by the supposedly purely qualitative character of the discrepancy between P-ness and non-P-ness.

Thus the chain of entities — along any such path from absence to presence of a certain property — is such that it is impossible for the senses or the imagination to fix a unique point where P begins or non-P ends. There is a spread-out border-fringe, a region of inflection or singularity, inhabited by many kinds partially endowed with mutually contradictory qualities (P-ness and non-P-ness).

Leibniz claims that the accepted hard and fast lines must be blurred and that the customary, comfortable sorting rules must be upset and partly subverted by a deeper and more insightful scanning of the world.

The most startling consequence of **PC** is the implied claim that all differences are of degree and not of kind (or, more exactly, that kind differences really amount to nothing but variations of degree). Leibniz repeatedly comes back to such a conclusion even expressing it by the joking title of '*principe d'Arlequin*', the view that *c'est partout comme ici*, to which he adds: '*aux différences de degré près*'. (Esp. see the *NN.EE.*) If any two entities whatsoever, purportedly of different kinds, are just, at most, at the opposite extremes of a chain wherein any intermediary stretch smoothly blends into its neighbours, then of course all things are alike (but not exactly alike).

But then, if all differences are variations of degree (an idea whose distant origins go back at least to Anaxagoras or even Heracleitus), then one could fear that in the end nothing matters that much. Leibniz is clearly aware of such misgivings; he only cautiously reveals the whole import of his ideas on the issue. His main — only hinted-at — reply seems to be that importance (or relevance, or significance) is also a matter of degree. Perhaps nothing matters to the utmost, but that does not mean that nothing matters at all. Mattering — or carrying weight — depends on being fraught with ontological and practical consequences. In virtue of **PC**, variations of degree in the antecedents are bound to yield only variations of degree in the consequents; but that does not mean that there is no discrepancy at all.

Leibniz seems to be aware, at least in part, of the serious consequences of his ideas on the overcoming of the absoluteness of purportedly qualitative boundaries. No strict separation of different orders of beings can be reconciled with such ideas, and hence easy, dependable dichotomies must be relativized, fuzzified, by dint of reckoning with entities which ought to be classified as partly possessing the property under consideration and partly lacking it.

Many practical guidelines would be in need of qualification, nuance, flexibilization, should we espouse **PC**. Which the early 18th Century was hardly able to envisage ('this century [our philosopher says in 1702] is not ripe to receive' those ideas) and even the 21st Century is far from being entirely amiable to.

In his letter to Redmond de Monfort (1715) Leibniz draws some conclusions from those ideas. No leaps can take place in the real world or even in the realm of possible truths. Any short stretch of apparently abrupt discrepancy is bound to be reduced to underlying gradual transitions just as the special points on a curve are determined by its general nature or its equation.

IV

One of the significant applications of Leibniz's continuistic or gradualistic metaphysics is the relation between different species, mainly that between our own human-kind and other animals. There are bound to be intermediary degrees between men and other animals — and between animals and plants, between being and non-being.

Leibniz goes considerably beyond his time's prejudice in denying the then ruling absolute anthropocentrism. In his *Theodicy* he expresses his doubts on whether God prefers one man to the kind of lions (II, §118, *Abrégé*, II). He develops such views in the *NN.EE.* and elsewhere, coming close to evolutionism. However it is also in the *NN.EE.* that our philosopher evinces some qualms over the practical consequences of such views.

Suppose that quite similar species live together; what will then be the appropriate behaviour of members of either to members of the other one? What would be the correct behaviour of humans towards non-humanus so close to us that the discrepancy would be exiguous or vanishing?

Thank God — Leibniz replies — such quandaries do not arise. The perfection of the universe demands an appearance of discontinuity ('*la beauté de la nature, qui veut des perceptions distinguées, demande des apparences de sauts* (*NN.EE.* IV, ch. 16 §12).

But why does the world's beauty require that there should appear to be leaps? Is not continuity more beautiful than interruption according to Leibniz's lights? Invoking such a need for apparent discontinuities seems to introduce an *ad hoc* epicycle in order to reach two goals: (1) accounting for the fact that our perceptive image of the world seems to leave gaps; (2) eschew the practical quandaries the side-by-side presence of quite similar kinds of entities (and in particular animals) would give rise to.

Such hesitations and almost partial retractions show that Leibniz's gradualism does not provide a fully satisfactory reply to a number of difficulties. We believe a neoLeibnizian more tenable gradualism is possible, though. (More on that in our last section, below.)

V

Did Leibniz apply his gradualism to the domain of Law? As far as we have been able to find out, he did not. When it comes to the realm of law, he seems to be content with the principle of *æqualibus æqualia*, or that of treating equal cases alike. But notice that such a principle does not rule out the existence of legal jumps. If a man snatches £5 and another man snatches £6, the existing legal system may impose an incomparably harsher penalty to the latter despite the small difference as regards the hypotheses. Whether such jumps are just or unjust, they do not transgress the *æqualibus æqualia* principle.

Even nowadays it is often claimed that both justice and juridical certainty demand that equal cases should be treated alike, but no further demand is posited as regards how to treat unequal cases.

What seems to be a little odd is for Leibniz to have called his general (physical and metaphysical) principle of continuity '*Lex Justitiæ*', and then to refrain from embracing any such principle precisely with regard to justice as such.

Although, as we noticed above, not all wordings of Leibniz's **PC** are logically equivalent among themselves, suffice it — as regards our current purpose, namely to set forth corresponding versions of the principle of justice concerning legal matters — to pinpoint the following possible versions.

Let X, Y, Z be three cases involving the presence of a juridically relevant property, P, and let A, B, C the juridical consequences of those cases, respectively, involving the presence of a property Q. Then the Leibnizian *lex iustitiæ* (applied to juridical matters) can be put in these different ways:

- (1) If the degree to which P is realized in X is smaller than the degree to which it is realized in Y, then the degree to which Q is realized in A must be smaller than the degree to which Q is realized in B.
- (2) If the discrepancy between the degree of P in X and the degree of P in Y is smaller than the discrepancy between the degree of P in Y and in Z, then as much happens as regards the discrepancy between the degrees of Q in A, B, C.
- (3) If there is at least as high a presence of P in Y as there is in X, then there is at least as high a presence of Q in B as there is in A.
- (4) If the degree of P in Y is intermediary between the degrees of P in X and in Z, then the degree of Q in B also lies in between the degrees of Q in A and in C. (Notice though, that — in a stretched sense if you want — any quantity lies between itself and itself, i.e. X lies between X and X.)

(1) is the rule making it mandatory to treat unequal cases unequally. Leibniz apparently espoused the metaphysical counterpart of (1) but we have found no evidence that he embraced (1) itself when discussing juridical matters. Notice that there were occasional moments in the juridical tradition when (1) seemed to be tempting legislators but, as a whole, traditional law was deeply inimical to (1) and even our modern, more humane and less draconian codes are far from accepting it. (1) rules out not only legal leaps but also unsensitiveness to the degree of presence of the relevant property in the hypothesis. An extreme case would be one wherein every difference of degree of P would leave the degree of Q unaffected. Then of course we would not be entitled to say that P was a juridically relevant property at all (at least not for juridical consequences involving Q). We sometimes find it distressing that two cases involving quite discrepant degrees of P should be legally treated in the same way; that is why (1) has some claim on us as a *desideratum* of fairness. However, all in all (1) seems to impose an excessive constraint, and we had better avoid committing ourselves to anything that strong.

As for (2), it would entail that, if empowering oneself of £3 entails a penalty of one month imprisonment and empowering oneself of £4 entails an year imprisonment, then empowering oneself of £7 must entail at least an imprisonment of 33 months. However (2) does not imply (1) — appearances to the contrary notwithstanding. If whosoever unlawfully

empowers himself of any amount of money must serve 1 year imprisonment, regardless of the concrete amount of money, then (2) — but not (1) — is complied with.

Leibniz sometimes seems to be countenancing the metaphysical counterpart of (2). As a juridical constraint (2) would be hard to be really considered, albeit a lingering impression (or «intuition» if you like) tells us that (2) is also a vague *desideratum*.

(3) is a principle of legal monotonicity. It implies that empowering oneself of £4 must be legally dealt with in at least as severe a manner as empowering oneself of £3. Probably all legal systems have complied with (3), since — as far as we know — no legal system has ever increased the severity up to a certain point and then decreased it (or anything like that). (3) does not rule out the existence of leaps, but forbids the existence of successive leaps in opposite directions. Notice that (3) also rules out a continuous, gradual mapping with sinuosities, which sometimes goes upwards and sometimes downwards. (People are fond of saying that in practice [though, of course, not in theory, and theory alone is of any concern to us here] legal treatment of unlawful acts breaches (3) and that empowering oneself of £1,000 entails a more severe punishment than empowering oneself of £100, but that empowering oneself of £1,000,000 in practice entails no punishment.)

(4) is the juridical counterpart of **PO**. (4) means that in-betweenness as regards the hypotheses is bound to entail in-betweenness as regards the juridical results. But, oddly enough, (4) does not really prevent the existence of leaps. Suppose that empowering oneself of less than £5 entails at most one month imprisonment whereas empowering oneself of £5 or more entails a term of 10 years imprisonment, with an additional aggravation of one day for any cent above the £5 limit. Then, oddly enough, (4) is not broken. But surely the pre-theoretical idea of a continuity of legal treatment would fall afoul of such a situation, which clearly involves the existence of a tremendous leap.

All that shows that finding out a clear formulation of the exclusion of leaps is no easy matter, either as regards juridical issues or as concerns metaphysics of philosophy of nature.

We are afraid that the exclusion of leaps cannot be adequately worded with the crisp terms of ‘equal’, ‘unequal’, ‘more’, or ‘less’ alone, but needs the introduction of a fuzzy term, ‘similar’. Then the legal principle of continuity would mean:

(5) Whenever the degrees to which the juridically relevant property P is realized in two cases, X and Z, are similar, then so are the degrees to which the juridically relevant ensuing property, Q, is realized in the respective juridical consequences, A and B.

In other words, you are forbidden from dealing with similar cases in quite discrepant ways.

Admittedly (5) lacks the clearcut precision of (1) through (4) but it seems to be what we mean when we spurn juridical leaps. And (5)’s metaphysical counterpart would be probably more defensible than those of the other candidates we have pondered.

(5) rules out leaps, for it implies that no small increase in the degree to which the juridically relevant property is realized may entail a huge increase in the degree of realization of the juridical consequence. Thus inflicting at most a 3-month imprisonment on culprits having taken at most £5 and 2 years on those having taken £5.01 clearly runs afoul of (5).

(5) is not an entirely perfect principle of fairness, though, since small sinuosities would be compatible with it. Thus perhaps what really we want is a combination of (5) and

monotonicity (i.e. (3)). However such small sinuosities don't seem to be a real problem in legal practice, since — as far as we know — they neither exist nor have ever existed.

Although (5) — or its metaphysical counterpart — seems to us to be quite congenial to Leibniz's whole project — and probably a better way of casting the idea our philosopher endeavours to take hold of and set forth in a convincing, reasonable way — we have failed to find our own formulation, (5), in any of Leibniz's texts, even if quite often it seems to us that the Master is hanging around something vaguely resembling (5) — or rather its metaphysical counterpart — but failed to express it in so many words.

As already noticed above, the main difference between formulation (5), on the one hand, and (1) through (4), on the other, is that all terms occurring in (1)-(4) are all-or-nothing notions. (Thus, to be more-so-and-so than another thing is not a matter of degree. If John is wealthier than Robert and so is Jack, it cannot be the case that John is more wealthier-than-Robert than Jack.)

On the contrary, similarity comes in degrees. Thus our most satisfactory candidate to the title of adequate formulation of the *lex iustitiæ*, or principle of juridical continuity, is a sentence involving a fuzzy term, 'similar'; without resorting to fuzzy terms convenient formulations of the principle ruling out jumps may, after all, be found, but we haven't happened to hit on any such formulation. Thus we surmise that a good enough formulation of the principle requires using fuzzy terms.

Anyway there are several difficulties surrounding the principle, whether under our own formulation or under any alternative one forbidding the existence of juridical leaps. The most usual objection is that some line or other ought to be drawn on pain of giving rise to quandaries or perplexities.

The objection can be sketched out by pointing out that legal norms — or norms of any kind whatsoever — are rules of conduct which must establish guidelines for human behaviour; but, allegedly, no such guideline would be possible unless it drew a line between what is mandatory and what is not — or between what is permissible and what is not — so as to direct people's behaviour in the sense of refraining from forbidden actions. Consequently, hard and fast lines are needed, and so leaps are unavoidable, since whatever lies on the wrong side of the line has to be out-and-out rejected whereas what lies beneath the line is admissible behaviour.

If the objection is particularly addressed to Leibniz (assuming Leibniz should uphold the juridical *lex iustitiæ* under our proposed (5) formulation), it would have a point, since Leibniz himself always embraced classical, two-valued, Aristotelian logic, with its two polarly opposed values of pure, and complete, truth and pure, and utter, falsity. Accordingly either an action is entirely licit or else it is altogether illicit. Furthermore, either an action can be altogether characterized as being so-and-so or else it cannot at all be so characterized. Likewise, either an action is entirely performed or else it is not performed at all (i.e. it remains a purely possible completely unrealized action).

Thus espousing the jumplessness principle — be it for the juridical domain or in any other field — is incompatible with maintaining Aristotelian, two-valued logic.

But from the standpoint of a nonAristotelian infinite-valued logic things are not so. We needn't waive the principle of excluded middle — to the effect that either an entity is so-and-so or else it isn't. What we need is to jettison the result of prefixing to the principle of excluded middle the particle 'completely'. Since the operator 'completely' (or 'wholly' etc) distributes

over disjunction («Entirely (p-or-q)» is equivalent to «Entirely p or entirely q»), what we are in effect rejecting is the alternative between a certain fact existing altogether and its complete failure to exist.

If there are degrees (degrees of legality or licitness, degrees of being-so-and-so, degrees of realization of an action), then no line has to be drawn. It is not the case that whatever lies beyond the (supposed) line is out-and-out rejectable or blameworthy, whereas whatever remains this side is entirely all right. What there exists is a porous, diffuse, stretch or fringe, wherein the farther from the good extreme an action lies, the more blame-worthy it is.

How can such a neo-Leibnizian approach be reconciled with our need for practical guidelines or rules of conduct instructing us as to what is to be done and what is not? The answer is again that it is not a matter of either entirely avoiding a certain action or else completely-taking it as something which we can envisage doing. There are degrees. Degrees of prevention, degrees of acceptance. Thus we can contemplate a certain behaviour with some degree of apprehension, but less so than another course of action which we we absolutely rule out.

Equally, once an action has been realized, there are sundry degrees to which it can be classified as being of such and such a kind. Thus, even if any behaviour of the kind is illicit, since the action under consideration can be more, or less, included into that kind, its licitness, or illicitness, can vary. Finally, even when two actions are equally (to the same degree) characterizable as being so-and-so, their respective degrees of reality can be different. The one can be more thoroughly realized than the other.

Most of all, to forbid a certain behaviour must entail to sanction it somehow or other (at the very least with some sort of legal upbraiding: whatever is banned is such that, at the very least, those who commit such a behaviour are to be regarded as transgressors). But sanctions can be harsher or less harsh. The more severe the penalty, the more forbidden the thus punished action.

A partly different sort of objection against our neoLeibnizian approach would be that it runs afoul of the need for juridical certainty or security. Supposed that, instead of drawing a clear-cut line, you simply claim that, the more a behaviour exemplifies a certain property, the less licit it is. Then — the objector goes on to say — there is bound to arise a feeling of quandary or uncertainty. Surely no written legal norm can settle as many different punishments as there are different actions inflicting to someone a certain degree of pain. Thus the only practical way of abiding by the requirements of the leaplessness principle is to leave concrete adjudications of guilt and punishment to judges, i.e. to set forth legal norms with fuzzy terms, leaving it to the judicial power to establish the adequate legal treatment in each case.

We reply that such a result is correct but needn't entail the apprehended uncertainty or insecurity, provided the legal system as a whole provides a mechanism in order to introduce uniformity or consistency. The mechanism exists in all legal systems endowed with procedures of appeal and revision.

Thus we reach the conclusion that our neoLeibnizian approach to juridical issues can be successfully implemented and would offer a more humane, more just, more flexible framework than those recommended by adherents of hard and fast lines, i.e. of such people as believe that leaps are necessary and therefore acceptable.

 VI

One source of disquiet remains, though: why did Leibniz never apply **PC** to legal matters, even if he called the principle itself '*lex iustitiae*'. The most probable answer which occurs to us is that there are plausible biographical reasons for that, but also logical grounds. As we have said above, consistently espousing the rejection of leaps calls for a gradualistic nonAristotelian logic, a logic of degrees of truth or existence. Now the only reference we have found in the Leibnizian *corpus* to the implementation of a logic of degrees is *NN.EE*. I IV, c. 16 (and of course similar passages elsewhere) to the effect that '*il faudrait une nouvelle espèce de logique qui traiterait des degrés de probabilité [...]*'. (On the need for a logic implementing degrees of verisimilitude also see a letter to D. Elerum, 10 May 1716, ap. Couturat, *La Logique de Leibniz*, p. 583.)

As we see, Leibniz is envisaging a new gradualistic logic, but a logic of degrees of probability, not of truth. When it comes to truth, he hangs on to the hard and old dichotomy of 1/0. Perhaps he lacked the conceptual tools needed for a fuzzy logic of degrees of truth. Or perhaps he possessed such tools but he lacked the time needed for such a colossal enterprise. Or perhaps he cringed from such a prospect owing to his (by and large) quite reasonable maxim of going by the received, entrenched, established and inherited opinions as far as possible.

Most of all we believe the right answer to such a question is that, Leibniz-ways, the cognitive enterprise is a collective, continuous, cooperative and trans-generational task. Leibniz anticipated many contemporary thoughts and research-lines — including some philosophical motivations for fuzzy logic — but he couldn't jump over the boundaries of his life-time.

Our second reply — which especially applies to his failure to consider **PC** as a rule for legal matters — attends to the fact that most Leibnizian writings on juridical issues were written in his youth, whereas **PC** tends to be a view characterizing his later life and thought (from 1686-87 on). Admittedly things are not that clear-cut. There are several important juridical papers written in 1693 and later. (Thus the *Corpus iuris gentium diplomaticus* was written in 1693 and 1700. In 1696 (see [GM] III pp. 347ff, letter to Jean Bernouilli) he was considering a projected *Elementa perpetui iuris*; a few months before his death, on July 1st, 1716 (see Couturat, p. 584) he was still caressing the idea of rationally recasted civil code.) And we occasionally find early pronouncements hinting at something like **PC**. All in all, though, the discrepancy exists as regards the shifting of his main interests and orientation. Had he come back to a full-time juridical vocation, then perhaps he would have followed the path blazed by his continuistic principle.

 VII

Although, as the reader has gathered, we deeply sympathize with Leibniz'scontinuum, we admit that Leibniz's own formulations go too far and that a more tenable principle of continuity is not easy to find.

PC rules out jumps whereas the existence of only one possible world, out of the infinite series of closely pair-wise closely resembling worlds, is a glaring case of a huge, tremendous, abyssal chasm. The principle would demand that whenever two given cases (i.e. two possible-worlds as ideally placed along a line of increasing perfection or metaphysical goodness) *s'approchent continuellement et se perdent enfin l'un dans l'autre*, so do the results ('*les suites ou événements ou ce qui est demandé*', [GP] III p. 52). Yet all worlds infinitely close to ours in their degree of perfection, even when the discrepancy *s'évanouit*, for ever remain entirely unrealized, whereas ours alone is blessed with real existence.

Leibniz could face such a difficulty by developing a nonAristotelian logic allowing for degrees of existence so as to have God choose each possible world to a certain extent, giving more reality to those worlds which, by their essential nature, deserve it more. The outcome would be a many-worlds universe, with different degrees of reality belonging to diversely perfect worlds. Admittedly such a universe would include, as real entities, all possible individual and facts — which doubtless is a quasi-Spinozistic result Leibniz would be eager to avoid.

Thus there are forceful reasons for Leibniz to refrain from applying **PC** to the function mapping the essential quantity of worlds into existence or inexistence. The mapping is discontinuous and jumpy. Leibniz could make it continuous only by coming quite close to Spinozistic metaphysics (at least as regards the claim that all possible are — at least to some extent — real) and by embracing a non two-valued logic and hence by proposing an alternative framework to classical sentential calculus.

[One of the two authors of this paper has already shown in «Le choix de Dieu et le principe du meilleur» (*Dialectica* vol. 47, Fasc. 2-3 (1993), pp. 217-54) how a neoLeibnizian possible-worlds Lewis-like realistic metaphysics can be reconciled with a nuanced version of Leibniz's theodicy.]

As already mentioned above, there is another strong objection against both **PO** and **PC**, one which did not escape Leibniz's attention altogether: there are both in mathematics and in real life mappings which do not abide by such principles.

Thus Leibniz would be compelled to fall back on some weaker position. There are a number of alternatives. One is simply that many — perhaps most — transitions comply with **PO** (and indeed **PC**). Another one is that, in some sense to be elucidated, each transition in breach of **PC** supervenes on an orderly transition (one complying with **PC**). A third alternative would be that nature tends to prefer orderly and smooth transitions and those transitions alone are unordered or abrupt which are bound to be so owing to a more powerful reason.

He hope that, one way or the other, a commonsensical implementation of Leibniz's gradualism can be logistically structured through a many-valued nonAristotelian calculus (a fuzzy system). Such a watered-down Leibnizian gradualism would retain many inferential links with the board of basic logico-metaphysical principles reigning over Leibniz's whole philosophical enterprise.