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I. Introduction

The real issue in personal injury cases is often damages[1]. Our concepts and law relating to negligence and other aspects of personal injury are sufficiently developed that parties can often agree upon who is at fault. Yet damages law, for all the cases and principles which have been decided, remains the least intelligible and thus the least predictable for parties and their counsel. When parties have to go to trial in a personal injury case, it is often primarily to decide who should pay what.

In the mystery land of damages law, the biggest mystery, even for lawyers, is non-pecuniary damages. Compared to non-pecuniary damage awards, pecuniary loss is just a matter of presenting bills for payment and plugging numbers into formulae. While pecuniary loss must often be speculative or technical, requiring expert evidence on inflation rates, present value and projected loss of income, it does not present as much of an appearance of being random, arbitrary or unexplainable.

Non-pecuniary loss appears mysterious, random, arbitrary and unexplainable even to those who deal with it because, more than any other aspect of personal injury, it must be compensated based upon the actual circumstances of the person who has been hurt. There are no shortcuts to assessing non-pecuniary loss, no expert predictions or formulae to assist the court in its responsibility to assess the injured person's condition. As the condition to be assessed differs so markedly from case to case, in the absence of general principles, the whole area seems to be a murky mire[2].

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1. The authors are indebted to Professor Stephen Wexler of the University of British Columbia for drawing their attention to this fact.

2. Thus, most writers on this subject begin by noting that money cannot replace lost functions or take away pain. *See eg.,* Kahn-Freund, O., "The Expectation of Happiness" (1941), 5 Mod. L.R. 81; Klar, L., "The Assessment of Damages for Non-Pecuniary Losses" (1978), 5 C.C.L.T. 262;

Existing jurisprudence has offered little assistance to lawyers, judges and parties trying to work through cases of non-pecuniary loss. The basic principle remains that the assessment of non-pecuniary damages is a matter within the discretion of the trial court[3]. Despite a trilogy[4], becoming a quadrilogy[5] of decisions by the Supreme Court of Canada in this area, the only rule which the Supreme Court has enforced consistently is that the award should not exceed $100,000[6], probably in 1978 dollars[7].

While the Supreme Court of Canada has argued at length the blessings of the "functional approach" to non-pecuniary loss[8], no court in Canada (including the Supreme Court itself) has ever considered what "alternative pleasures" a plaintiff would use a damage award for, nor has there ever been a clear explanation of how this would be done. Canadian courts have properly copied what the Supreme Court of Canada *did* (ignoring what it said) and merely used the functional approach as an excuse to keep non-pecuniary damage awards low[9], arguably for political rather than legal reasons[10].

Given the illusion of the functional approach, there is virtually no rule for calculating non-pecuniary loss, beyond the Supreme Court of

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McLachlin, B. "What Price Disability?" (1981), 59 Can. Bar Rev. 1. However, this is a non-issue: money does not replace lost reputation in defamation or lost goodwill in passing-off goods, but we do not seem to have such problems in using money to compensate these injuries. It is submitted that what the writers are referring to is the lack of any agreed *method* for relating pain and lost faculties to amounts of money. As Dickson, J. put it in *Andrews* v. *Grand & Toy Alta. Ltd.*, [1978] 1 W.W.R. 577 at 602 (S.C.C.) the problem is that there is no "medium of exchange" for happiness, no "market" for pain and disability, not that money cannot do miracles.

3. *Nance* v. *B.C. Electric Railway Co.*, [1951] A.C. 601, *Andrews, supra,* note 2, at 235 and *LeBlanc* v.*Penticton,* [1981] 5 W.W.R. 289 (B.C.C.A.).

4. *Andrews, supra,* note 2; *see also Thronton* v. *Board of School Trustees of School District No. 57 (Prince George),* [1978] 2 S.C.R. 267 and *Arnold* v. *Teno,* [1978] 2 S.C.R. 287 (S.C.C.).

5. With the addition of *Lindal* v. *Lindal,* [1982] 1 W.W.R. 433 (S.C.C.), revisiting the non-pecuniary damages issue specifically.

6. *See* Klar, L., "Developments in Tort Law" (1983), 5 Sup. Ct. Rev. 273.

7. There is some doubt about the whether the limit on non-pecuniary damages is in 1974 or 1978 dollars. *See: Hatton* v. *Henderson* (1981), 26 D.L.R. (3d) 50 (B.C.C.A.).

8. *See: Andrews* and *Lindal, supra,* note 4.

9. *Penso* v. *Solowan and Public Trustee,* [1982] 4 W.W.R. 385 at 395-396 (B.C.C.A.).

10. One of the authors has argued elsewhere that the interest in limiting non-pecuniary loss compensation arises primarily from the political power of third-party insurers (including the State) *vis-a-vis* that of the small group of injured plaintiffs and that such limitation is inconsistent with any legal principle of awarding damages. Effron, J., "A Comparative Study of Nonpecuniary Damages in Common Law Countries" (1988), 10 Houston J. Int. Law 211 at 229. Dickson, J. virtually admitted this in *Lindal, supra,* note 4, at 12, by stating that, while "social costs" must never be considered in awarding future pecuniary loss, they *must* be considered in awarding non-pecuniary loss compensation. "Social costs" in this context means little more than the costs of third-party insurers who pay the compensation.

Canada's vague demands that the awards be kept as low as possible. In this vacuum, courts do not know how to calculate non-pecuniary damage awards. In the smokescreen of the functional approach, parties, counsel, scholars and the public at large do not know how courts are calculating non-pecuniary damages.

The purpose of this paper is to examine how Canadian judges award non-pecuniary loss compensation and, from such a picture of present reality, to bring more clarity and pragmatism to discussion and practice in this area. A clear picture of how non-pecuniary damages are being calculated can be useful to parties and lawyers in predicting, understanding, and accepting how damages will be awarded in their own cases. A clearer picture of how non-pecuniary loss is being compensated can be helpful to appellate judges and policymakers in making decisions about how non-pecuniary damage awards ought to be calculated.

II. The Technique of Analysis

A lawyer would consider that the most obvious place in which to look to see how non-pecuniary damages are being calculated is at the reasons of the judges who compensate non-pecuniary damages. The basis of this study is therefore over 100 Canadian non-pecuniary damage awards at trial and appellate level in 1978-82[11].

There is a problem, however, in just reading the judges' reasons and stopping there. The normal practice is for the judge to list the plaintiffs' injuries and then award a figure for compensation, without explaining the connexion between the injuries and the award[12]. We know intuitively and as a matter of law (since the judge's decision must be based upon the evidence and the purpose of the award is still *restitutio in integrum)* that there is a logical connection between the plaintiff's injuries and the award, but we do not know the nature of the connection. In fact, the Supreme Court of Canada's insistence upon a global award[13] and its

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11. The cases used are available from the authors on request.

12. A typical example is the following extract from *Paterson* v. *Bearchief* (1978), 14 A.R. 48 at 65-66 (Alta S.C.): "The evidence establishes that there was substantial pain and suffering for considerable time. The plaintiff suffered several operations and also had several physiotherapy treatments. His major loss was the sight of an eye. There is a possibility. . . of the loss of his other eye. The disability in his left arm restricts many of his activities. He has suffered disfigurement to his face, throat, arm and leg. . . The plaintiff was a normal, healthy young man before the accident. He is now considerably restricted in many of his activities. I think a fair assessment on this score would be $35,000.00".

13. Dickson, J. endorsed this "customary" practice in *Andrews, supra,* note 4, at 264.

disdain for giving "so much for a foot"[14] discourages judges from explaining how the plaintiff's injuries determine the extent of the award.

Therefore, if we are to tell from the practice of judges facing various sorts of injuries how they assess damages and to see whether there is any common rule or practice among judges in assessing damages, we can only do so by observation of the results and logical inference therefrom. Happily, the multiple regression technique in statistics is designed for such circumstances: to test the likelihood that our assumption that the type and severity of injuries determines the level of the award is true and to help us predict, given a set of injuries, what level of compensation these judges would award.

The use of statistics in law has won rapid and increasing acceptance in recent years. The best-accepted and most-established use of statistics in law has been the use of statistical evidence to show "patterns" and "practices" of racial and sexual discrimination by employers in the United States[15]. Such statistics have been accepted by American courts as evidence in Civil Rights Act cases. Another common use of statistical and mathematical techniques has been in the criminal justice system, to determine optimal jury size, pre-trial detention policy, *etc.,* also mostly in the United States[16]. Quantitative techniques have been used as well in calculating pecuniary damages in discrimination and tort cases, to deal with such issues as present value of awards and lost wages or back pay[17].

Yet the use of quantitative methods in calculating pecuniary loss has not been followed in calculating non-pecuniary loss, although, as argued in this paper, it may be even more necessary to do so. Instead, lawyers have been forced to look for substitutes. Personal injury practitioners are familiar with consolidations of personal injury awards such as Cooper-Stephenson and Saunders[18], which lay out the injuries and awards side-by-side: what is missing is any statistical analysis which would explain the

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14. *See* Dickson, J.'s comment on Ogus, A.'s "conceptual approach" to assessing non-pecuniary loss "Damages for Lost Amenities" (1972), 35 Mod. L.R. 1, in *Andrews, supra,* note 4 at 261 and in *Lindal, supra,* note 5 at 451.

15. Copus, D., "The Numbers Game Is the Only Game in Town" (1977), 20 Harv. L.J. 374; Whittan, D., "Statistics and Title VII Proof" (1978), 15 Houston L.R. 1030; Bode, E., "Auditing Affirmative Action through Multiple Regression Analysis" (1980), 31 Labor L.J. 115.

16. Clarke, S. and Koch, G., "The Influence of Income and Other Factors on Whether Criminal Defendants Go to Prison" (1976), 11 Law and Soc. Rev. 57; Kaye D., "The Laws of Probability and the Law of the Land" (1979), 47 Univ. of Chi, L.R. 34; Nagel, S., "Some Statistical Considerations in Legal Policy Analysis" (1980), 13 Conn. L.R. 17.

17. Greenberg. R., "Quantitative Aspects of Legal Analysis", [1976] Insurance L.J. 589; Brams, M. and Rines, N., "The Determination of Economic Loss in Tort Cases" (1976), 6 J. Contemp. L. 121; Manning, J., "Multiple Regression Analysis", [1982] Univ. of Ill. L.R. 449.

18. Cooper-Stephenson, K. and Saunders, I., Personal injury damages in Canada (Toronto: Carswell, 1988).

connection between the awards and injuries rather than forcing the lawyer to do his own *ad hoc* and guesswork prediction from looking at, say, 15 awards for back injuries. Nagel has suggested the use of statistical techniques, including the multiple regression technique used in this paper, to predict personal injury case outcomes[19] and has conducted an analogous study of civil liberties cases in the U.S. Supreme Court in the 1950s[20].

Multiple regression is commonly used in social sciences such as economics, political science and sociology[21] when one has information about a number of different variables which one believes are related: the purpose of the regression is to test the accuracy of this belief on the information available. In our case, the "variables" which we believe are related are the level of damage award and the various types of injury — paralysis, incontinence, disfigurement, *etc.* Moreover, we believe that the variables are related in certain ways: *eg.* that a greater degree of paralysis would produce a higher level of damage award but a lesser degree of paralysis would produce a lower award. The regression technique uses mathematical principles to tell us whether, from the cases we have used, a given injury is relevant to the level of damages awarded. In other words, the regression techniques allows us to test whether Ison's hypothesis that tort awards are merely a "lottery"[22] is true (in regard to non-pecuniary damages in Canada for 1978-82) or whether there is in fact a logical and explicable connection between award and injury, even for the supposedly discretionary and inexplicable non-pecuniary award. In addition, because the regression technique allows us to derive a "regression equation", we can see, from the cases used, roughly what each type of relevant injury was "worth" in damages.

We have deliberately omitted any discussion of the technical mathematical operations which are involved in regression analysis and concentrated upon the relevance of the technique to legal practice[23]. In summary, multiple regression analysis allows us:

(i) to test alternative assumptions about how non-pecuniary damage awards are arrived at;

(ii) to test assumptions about the impact of individual injuries and plaintiff characteristics on the level of award to a plaintiff;

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19. Nagel, S., "Predicting Court Cases Quantitatively" (1965), 63 Mich. L.R. 1411.

20. Nagel, S., *supra,* note 16.

21. *See:* Weisberg, S., Applied Linear Regression (New York: John Wiley and Sons, 1960); Beals, R., Statistics For Economists (New York: R and McNally, 1972).

22. Ison, A., The Forensic Lottery (1967).

23. There is no shortage of books on statistics and regression in particular, *eg.,* those cited at note 21.

(iii) to make rational predictions about the level of award to a plaintiff based upon information about that plaintiff's injuries and characteristics; and
(iv) to have some idea of the degree of confidence we can have in the conclusions reached in (i) — (iii).

III. The Study and Its Results

The study began by a reading of 101 Canadian negligence cases involving the award of non-pecuniary damages. Although the judges, as explained above, were less than clear about how they arrived at a figure for the non-pecuniary damage award they gave, there was a pattern, in that the judges seemed to refer to the same sorts of characteristics and injuries of the plaintiffs in case after case. Also, certain injuries, such as paralysis and incontinence, seemed to be mentioned in connection with the highest awards. Therefore, a list was made of the sorts of injuries and plaintiff characteristics which seemed to recur in the various judgments. Our hypothesis was that these characteristics and injuries were the determinants of the damage award: this was the hypothesis which we used the regression technique to test. These "independent variables" were: (1) whether or not the plaintiff was quadriplegic: (2) whether or not the plaintiff was paralysed to a lesser degree than quadriplegia; (3) whether or not the plaintiff was incontinent; (4) whether or not the plaintiff was permanently unable to work at the job at which he had worked before the injury; (5) whether or not the plaintiff was temporarily unable to work at the job at which he had been working before the injury; (6) whether or not the plaintiff's intelligence or ability to do such simple tasks as carrying on conversation or doing simple arithmetic had been damaged; (7) whether or not the plaintiff suffered psychological damage such as depression or violence which had not been a part of his personality before the injury; (8) whether or not (for males and females separately) the plaintiff had suffered permanent physical disfigurement; (9) whether or not the plaintiff had lost the ability to drive a car; (10) whether or not the plaintiff had been rendered permanently unable to live at home and must be institutionalised; (11) the length of time that the plaintiff experienced pain; (12) the judges' comments about the intensity of the pain experienced by the plaintiff; (13) whether or not the plaintiff lost his sexual function; (14) whether or not the plaintiff had lost various recreational activities such as sports or the ability to play with his children, which he had enjoyed before the accident.

The second group of variables, which we hypothesised would affect the non-pecuniary damage award, and which had been mentioned in many of the cases, were factors about the plaintiff's loss rather than

injuries *per se:* (15) how many days the plaintiff was in hospital; (16) the likelihood of further medical treatment; (17) the prospects for improvement or deterioration in the plaintiff's condition. Such factors appeared to be considered by the judges as relevant to the seriousness of the injury and lawyers will recognise them as the sorts of matters which they try to lead in evidence if possible.

The final group of variables are what we call process variables, referring not to the plaintiffs but to the impact of the legal process on the award: (17) whether and to what extent the judge purported to follow the Supreme Court of Canada's "trilogy" on personal injury awards; (18) the year in which the judgment was rendered (which can also be a rough surrogate for inflation); (19) the province in which the judgment was rendered; (20) the age of the plaintiff; and (21) the gender of the plaintiff.

The specific techniques of defining these variables and entering them into the regression equation in number form are described in Appendix A. Here we are interested in the results of the regression, which are themselves presented in statistical form in Appendix B.

Out of the 21 variables listed above, 10 come out of the study as having a discernable impact on the level of the award[24]. These are listed following, with the estimates of their values for the cases used in this study:

(1) Quadriplegia — $70,920.72
(2) Paralysis less than quadriplegia — $30,299.80
(3) Incontinence — $22,546.96
(4) Inability to work — $16,136.88
(5) Reduced ability to work — $24,754.56
(6) Female with disfigurement — $14,898.87
(7) Inability to live at home — $24,173.79
(8) Length of pain (actual + projected) — $11.82 per week
(9) Age — total award *reduced* by $548.19 by each year of the plaintiff's age
(10) Year — total award *increased* by $379.22 for each year after 1978.

Note, however, that the fact that a variable does not appear in the list above does not necessarily mean that it had no effect on the level of the awards, or would not do so today. If, for example, a given injury only

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24. As explained in Appendix B, the regression was run twice, once with the requirement that zero injuries yield zero award and once without such a requirement. As such a requirement is not only legally and logically but also (as shown in Appendix B) statistically more sound, only the results of the regression with this requirement are presented in the text. The results of both regressions are presented in Appendix B, where it can be seen that they are quite similar.

occurs a few times in the cases studied, this can be insufficient for the regression to find a statistically-trustworthy result. The results are influenced by statistical technique and are only relevant to the cases used.

IV. Conclusions

It is not warranted that one can take the rough figures in this study and predict a specific plaintiff's damage award in pending litigation. These are "average" figures and a specific counsel's judge might not be the "average" one for Canada's judiciary as a whole. Also, the cases used were from the late 1970s and early 1980s: prices at least have changed and the judiciary's approach to non-pecuniary damages may have changed as well.

The significance of this study is more general. First, the study has demonstrated that it is possible to get valid results from doing a multiple regression analysis on the facts and decisions of cases. Others, by doing similar regressions on other cases or more recent ones can show whether or not these results really are of predictive value and what the rough "value" of these injuries are in terms of damage awards. This study may not alone be sufficient to use for prediction but it has shown the way. As is shown in Appendix C, the statistical significance of the results of this study is indeed impressive, so the technique may be said to have been validated.

Indeed, there is no reason why this technique of using multiple regression analysis to understand how legal decisions are made when the reasons have not been made clear should be limited to non-pecuniary damages. Some fruitful areas of inquiry, for example, may be regressions between the facts in evidence and jury verdicts or between the facts in evidence and unreasoned decisions of administrative tribunals.

There are also interesting conclusions about the way in which non-pecuniary damages are calculated in Canada. First, there is the wide discrepancy between the theories enunciated by the Supreme Court of Canada and the practice of the lower courts. The study confirms our hypothesis that the courts are in fact using a "tariff" approach to calculate non-pecuniary damages (so much for quadriplegia, so much for ability to work), just as they have always done[25] and just as the Supreme Court of Canada has told them not to do[26]. The study did not suggest that it made any difference whether the lower court purported to follow, distinguish or ignore the Supreme Court of Canada's "trilogy" on the issue.

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25. Cooper-Stephenson and Saunders, *supra,* note 18 at 361 *et seq.*

26. This is the "conceptual" approach decried by the Supreme Court of Canada *(see* note 14, *supra).*

On the other hand, the study shows that non-pecuniary damages as they are calculated in practice are neither random, unpredictable or unintelligible. The damage awards are directly related to the number and intensity of the injuries of the plaintiff and characteristics such as the sex of the plaintiff or the province in which the judgment is rendered were happily not found to be significant. Thus, the award of non-pecunary damages in Canada, at least on the data used for this study, is not a "lottery". The tariff described in these results provides an equitable and consistent way for judges to calculate, counsel to predict and parties to understand their non-pecuniary damage awards, once the appropriate values for each head of injury are set. The tariff also allows legislatures or appellate courts to adjust values consistently which they find to be too high or too low. In all these respects, the practice of the judges is preferable to the Supreme Court of Canada's hypothetical "functional approach".

Appendix A

I. Explanation of Variables

1. AWRD — The non-pecuniary damage award, in dollars. In statistical terms, this is the dependent variable.
2. AGE — The age of the plaintiff receiving the award of non-pecuniary damages. If the age is not mentioned, we assume it to be the average age of plaintiffs whose ages were mentioned, to avoid skewing the data.
3. QUAD — Quadriplegia or paralysis of all four limbs. If the plaintiff is quadriplegic, QUAD = 1, otherwise QUAD = 0.
4. PARA — Paralysis less than quadriplegia. If this applies to the plaintiff, PARA = 1, otherwise PARA = 0.
5. CONT — Lack of bowel and/or bladder control as a result of the defendant's negligence. In fact, all of the plaintiffs who were incontinent were both bowel and bladder incontinent. If this injury is mentioned in the judgment, CONT = 1, otherwise CONT = 0.
6. WORKPERM — The plaintiff is permanently unable to undertake regular employment as a result of the defendant's negligence. If this is mentioned in the judgment, WORKPERM = 1, otherwise WORK-PERM = 0.
7. WORKPART — The plaintiff is, as a result of the defendant's negligence, not able to work to the extent done before the negligent act. If this injury is mentioned in the judgment, WORKPART = 1, otherwise WORKPART = 0. Of course, if the plaintiff is totally and permanently unable to work, WORKPART = 0 and WORKPERM = 1.

8. MIND — Damage to the plaintiff's mental ability. Examples include a fall in "IQ", inability to do simple arithmetic which the plaintiff could do before the defendant's negligent act, loss of memory, inability to carry on a conversation or to concentrate. If any of these or analogous injuries are mentioned in the judgment, MIND = 1, otherwise MIND = 0.
9. PSYC — Emotional damage. Examples include depression, inability to relate to friends and family in ways normal to the plaintiff, fear of people generally. If any of these or analogous injuries are mentioned in the judgment, PSYC = 1, otherwise PSYC = 0.
10. DISFEM — Noticeable, permanent injury to the plaintiff's body as a result of the defendant's negligent act which the judge has not dismissed as trivial or insignificant, where the plaintiff is female. Examples include loss of limbs, reduced use of limbs short of paralysis, scars, loss of hair or skin. If such damage is mentioned in the judgment, DISFEM = 1, otherwise DISFEM = 0.
11. DISFM — *Mutatis mutandis* the same as DISFEM, except that the plaintiff is male rather than female.
12. DCAR — Inability to drive a car due to the consequences of the defendant's negligent act. If such injury is mentioned in the judgment, DCAR = 1, otherwise DCAR = 0.
13. HOME — The plaintiff is unable to live at home without nursing or other permanent care or supervision, or the plaintiff must reside in an institution for the foreseeable future, due to the defendant's negligence. If this injury is mentioned in the judgment. HOME = 1, otherwise HOME = 0.
14. LPAI — The length of pain experienced by the plaintiff, in weeks, past and for the foreseeable future (according to the medical evidence accepted by the judge), as a result of the defendant's negligence. If there is no pain or pain is not addressed in the judgment, LPAI = 0. If pain is mentioned but the duration of the pain is not stated, LPAI = 52 (one year). If the judgment refers to cyclic or periodic pain, LPAI is counted from the first reported pain to the end of expected pain or, if no end is expected, LPAI = 52.
15. IPAI — An attempt to reflect the intensity of pain rather than just its duration as in LPAI. IPAI is a scale: IPAI = 5 is "excruciating"; IPAI = 4 is "severe"; IPAI = 3 is "significant" or "continuous"; IPAI = 2 is "mild" or "cyclic"; IPAI = 1 is "minor" or just "discomfort". The adjectives came from the judgments.
16. IMPR — Prospects for improvement; i.e. for future complete or partial reversal of the plaintiff's injuries. If the judge found that improvement was unlikely or that it was possible that the plaintiff's injuries would intensify over time, IMPR = 1. If it was likely that the

plaintiff would improve, or if the judgment did not discuss the issue, IMPR = 0.

17. TREA — Likelihood that the plaintiff would have to undergo future medical treatment as a result of the present injuries. If such likelihood was found by the judge, TREA = 1, otherwise TREA = 0.

18. HOSP — Number of days the plaintiff spent in hospital or similar total care facility (*eg.* nursing home). This does not include home care, visits to a doctor's office or intermittent therapy (*eg.* outpatient treatments). If the number of days in hospital is not stated by the judge, HOSP = 0.

19. SEXA — Loss of sex function for physical or emotional reasons due to the negligence of the defendant. If the sex function has been lost completely, SEXA = 2. If the function has merely been impaired, SEXA = 1. If nothing is said on the subject in the judgment or if there has been no loss in the function, SEXA = 0.

20. RECR — The plaintiff has lost the ability or interest to participate in any social or recreational activity (*eg.* clubs, sports or even just the ability to play with one's children) due to the defendant's negligence (but not merely due to time in hospital or recuperation). If this injury is mentioned in the judgment in any respect, RECR = 1, otherwise RECR = 0.

21. TRIL — The extent to which the judge made use of the Supreme Court of Canada's judgments on non-pecuniary loss cited in notes 4 and 5. If the judge considered the trilogy as binding or applied them in any other way beside "bearing them in mind" or merely comparing the injuries of the plaintiff-at-bar with those in the trilogy decisions, TRIL = 3. If the judge only compared the injuries of the plaintiff-at-bar with the injuries of the plaintiffs in the Supreme Court decisions, TRIL = 2. If the judge mentions the Supreme Court judgments but does not do any more (*eg.* following or distinguishing them), TRIL = 1. In all other cases, TRIL = 0.

22. YR — The year in which the judgment was issued (trial or, if appealed, the year in which the appeal was either allowed or dismissed).

23. AL, BC, MAN, NB, NF, NS, ONT, PEI, QUE, SASK — The province in which the judgment was issued. The province in which the judgment was issued = 1 with all other provinces set equal to = 0. For example, where the judgment was one of the Prince Edward Island Supreme Court, PEI = 1, AL = 0, BC = 0, MAN = 0, NB = 0, NF = 0, NS = 0, ONT = 0, QUE = 0, SASK = 0.

24. SEX = If the plaintiff was female SEX = 1, otherwise SEX = 0.

II. Logic of Variables

1. Except for YR, AWRD, LPAI, AGE and HOSP, which measured known quantities (*ie.* years, dollars, weeks, months, *etc.*), most of the variables measured the existence or non-existence of a type of damage: 0 is no damage and 1 or a scale shows the existence of damage. The exceptions to this principle are TRIL and SEX which described certain aspects of the judgment and plaintiff, respectively.

2. We assume that every factor (whether an injury like CONT or QUAD or a characteristic like AGE or SEX) which a judge mentions in the judgment was in his mind and considered in making the award of non-pecuniary damages. As the judgment is a finding of fact (in the case of a trial judge) or a recital of facts found by a trial judge (in the case of an appellate judge), this assumption is justified by law as well as logic. While judges may engage in *obiter dicta* on questions of law, they do not generally indulge in idle chatter in finding facts and it is rational to assume that the facts found, on the evidence presented, are relevant to the decision. The multiple regression essentially tests this assumption.

3. When an injury is not mentioned in the judgment, we have generally set it at 0. On the same logic as we used in including every variable which was mentioned, we assumed that, if an injury was not mentioned, it either had not occurred or the judge had not considered it in making the damages award (perhaps because he did not believe the evidence relating to it or did not consider it significant).

4. AGE and LPAI caused special problems when they were missing from the judgment. Obviously, setting AGE at 0 would be tantamount to assuming that the plaintiff had just been born, while, the judge having mentioned pain, it should have been illogical to assume that LPAI = 0, *i.e.* that the pain had no duration. Therefore, in the case of AGE, we assumed that the plaintiff was the average age of all the plaintiffs in the sample because, statistically, the sample mean can be shown to be equal to the population mean. Thus assuming that the missing values are equal to the sample mean minimises bias in estimating the regression equation. In the case of LPAI, where life expectancy was available in the judgment and pain was expected to last the plaintiff's life, we set LPAI equal to the plaintiff's expected remaining days of life. In other cases, we set LPAI equal to the number of days during which the plaintiff was said to have experienced pain up to the date of the judgment. SEX might have been another problem of this sort, but we were able to ascertain the sex of the plaintiff in each case used, from the plaintiff's first name cross-checked with the forms of address used by the judge in the judgment (*eg.* "Mr." or "Mrs.", "He" or "She").

III. Research Methodology

1. The cases used were personal injury cases where damages were awarded in negligence and where the amount was $5,000 or more, in all Provinces, from the handing down of the trilogy judgments by the Supreme Court of Canadian 1978 until data collection stopped in mid-1982.

2. The source of cases was the Canadian Abridgment volume for Damages in the section for Non-pecuniary Loss in Tort. Only reported cases were used. The Abridgment was also used to discover cases by noting up the trilogy and *Lindal* v. *Lindal* cases.

3. Negligence cases were used on the basis that, although non-pecuniary loss may be awarded for some intentional torts like assault and battery, the award may be affected by a punitive element in these cases which should not appear in negligence. In the intentional tort cases it would not be clear whether the value of the plaintiff's injuries or the impermissibility of the defendant's conduct was being assessed.

4. The $5,000 threshold was used because most of the jurisprudence in this area deals with serious injury such as quadriplegia and also because injuries in the cases below $5,000 tend not to involve the same sorts of variables (paralysis, incontinence, inability to work, *etc.*) which have impact on the larger cases. Many of the smaller cases would thus have 0 values for all the variables in the survey, distorting the statistics. Where they did have values (*eg.* for disfigurement) they might be quite misleading: the "disfigurement" of a minor scar under the clothing for which one might receive $1,000 is virtually a different injury from a distorted face or lost limb for which one might receive $5,000, yet both would have to receive a "1" for disfigurement. Alternatively, we would have had to subjectively weight the disfigurement variable to show how much more important one type of disfigurement was than the other, which would have been statistically doubtful.

5. No attempt was made to select or randomise the cases: every case which could be located and met the criteria of paragraph 1 of this Part of this Appendix was included. While it is not warranted that every reported case was discovered, virtually all the cases during the relevant period were discovered and used. The only case specifically deleted was *Knutson* v. *Farr* which concerned an unconscious plaintiff who was arbitrarily awarded one-half the maximum award. This was deleted on the ground that it was qualitatively different to the rest of the cases and that the arbitrary nature of the award would bias the sample.

6. The study was originally done in 1982-84 at the University of British Columbia. However, in 1988, Dr. Forster re-worked the statistical method and ran the regression again in 1988, at Griffith University in Brisbane, Australia. The re-working involved going back to the case reports to change some of the data entries. Despite our best efforts, some of the cases in the original data set, including all three of the Quebec cases in the original set, could not be obtained in Australia. Therefore, these had to be dropped from the set.

IV. Statistical Analysis

As the equations have resulted, the award is determined by summing the injuries sustained, each injury weighted by an estimated parameter value. The parameter value indicates or measures the impact of that injury in dollar terms upon the overall level of the award. In mathematical terms this is a straightforward linear function of the simplest type: more complex functional forms and transformations of variables (such as logarithmic functions) did not perform nearly as well statistically as the results presented. The result is especially useful because the linear form allows us to treat the parameter estimates directly as dollar values in determining the overall award.

The regression was run twice: once with a constraint that the intercept equal 0 and once without such a constraint. "Model 1" is with no constraint and "Model 2" is with the intercept held at 0. "Model 2" is reported in the text of the paper. The reason for running two models is two-fold: (1) because of the nature of the regression model and (2) because of the legal imperative that awards must vary with the degree of the injuries and thus, that no or very small injuries must yield no or a very small award.

Theoretically, if a plaintiff receives judgment in negligence but has no non-pecuniary losses (*i.e.* no pain, suffering, physical, mental or emotional injury or loss of amenities or bodily function), two conclusions must follow:

(i) each of the variables in the regression equation must have a value of zero and therefore

(ii) the award as summed by the regression equation must equal zero.

In Model 1, we permitted the intercept term to be estimated from the statistical analysis, which produced a coefficient of $31,495.87. As such a result is inconsistent with the legal and theoretical imperatives just described, we tried the regression again in Model 2 with the intercept coefficient fixed at 0. In every other respect the methodology of entering the data into the computer is identical between Model 1 and Model 2.

The statistical results in Model 1 and Model 2 are quite similar in many respects, with those in Model 2 being uniformly superior. R^2 was 0.722 for Model 1 and 0.883 for Model 2. The associated adjusted coefficient of determination was 0.698 for Model 1 and 0.872 for Model 2. The F statistic was 26.20 for Model 1 and 68.68 for Model 2.

Therefore Model 2 is superior not only in terms of what is legally-acceptable (that zero injury should yield zero award) but also in terms of the standards of statistical evaluation. For these reasons, Model 2 results are reported in the text and Model 1 results are merely included for information in this Appendix.

The output of Model 2 includes all the variables which are present in Model 1, with the exception of YEAR, which appears in Model 2. Also, we note that the coefficients in Model 2 and Model 1 are strikingly similar, many within one per cent of each other. All of the variables are statistically significant at the 0.05 level.

The variable YEAR in Model 2 is rather curious, suggesting, at a high degree of significance, that the value of the award increases by $379.22 each year merely by the effluxion of time. To the extent that it is a surrogate for inflation, YEAR is grossly understated, suggesting, at a time when prices were rising at 7-10% per year, that the judges were adding on less than 1% to the awards each year. To the extent that the variable really does represent the effluxion of time, it is overstated, as the passage of time is not legally sufficient to justify giving a later plaintiff with the same injuries and circumstances a higher award (even by a few hundred dollars) than an earlier plaintiff. This result is an anomaly and it is not clear what (if anything) it means, but it is not central to the validity or interpretation of the study as a whole.

The other variables which were found to be significant seem to be quite consistent with legal principles. Note that age is chronological age of the plaintiff and has nothing directly to do with life expectancy. Life expectancy was deliberately not included as a variable, as damages for the loss of expectation of life is compensated as a separate head of damages from oter non-pecuniary loss. The reduction of the Canadian awards as the plaintiff is older suggests an awareness of the sort of overlap between non-pecuniary loss and loss of life expectancy which led English judges to limit loss of expectation of life awards in *Benham* v. *Gambling*, [1941] A.C. 157 (H.L.) and the British Parliament to abolish them altogether in the Administration of Justice Act 1982, c. 53, s. 1. Still it seems logical that, as a plaintiff is older, he will suffer his loss for a lesser period of time and thus is less damaged, for instance, than a child who must bear the losses for life. Thus, there is a rational explanation for the negative sign of the age variable and the result shows that Canadian

judges (although they do not directly refer to these precedents) are consistent with their English brethren *(see* 12 Halsbury's Laws of England para. 1147 n.1 (4th ed. 1979) in this regard.)

The high awards for paralysis, incontinence, inability to live at home and inability to work are roughly what one would expect, as these are considered, both on the bench and in the community, as the most serious injuries. In fact, these injuries are the composite picture of the "worst case" plaintiffs acknowledged by the Supreme Court of Canada: Andrews, Teno, Thornton or Lindal qualify as having 'all of the above'. Add the coefficients for QUAD, CONT, NWORK AND HOME, then deflate them by, say, Andrews' age (multiplied by the AGE coefficient of 548.19) and you have something very close to the $100,000 maximum set by the Supreme Court of Canada for these types of cases. It is interesting (and also expected) that paralysis *per se* is valued as less than one-half the damage of the total paralysis which is quadriplegia.

The fact that a partial inability to work is valued at a higher award than a complete inability to work may be at first glance anomalous. However, given the Supreme Court's declared worries about "double-counting" damages and overlapping between pecuniary and non-pecuniary loss awards, it is not surprising that the judges would somewhat reduce awards for a total inability to work (where damages for lost income and future care are most generous) but not make a reduction for a partial inability to work where significant overlap is far less likely. In fact, this directly mimics the approach of the Supreme Court of Canada in *Andrews' Case*, although no court in the survey openly addressed this issue in its stated reasons on non-pecuniary loss.

Another interesting result is the fact that the regression showed female disfigurement (DISFEM) to be significant in determining the level of the award, but not male disfigurement (DISFM). There is no traditional legal justification for this result whatsoever: but there is a socio-legal justification for it. If the physical appearance of females is valued, both by the plaintiff subjectively and by the "reasonable person" in Canadian society, but the physical appearance of males is not so valued, then females suffer damage when they are disfigured but men do not: and such damage must be compensated in the case of females but not in the case of males. This argument (and the regression) seems to overstate the case, but there is a grain of common sense in it.

LPAI seems rather small at $11.82 per day — far less than the average wage and still farther less than what one might demand to be paid to undergo pain continuously for a week! It is unfortunate that IPAI did not show as significant, as this would allow some scaling of this variable: it might be right for "mild" or "cyclic" pain but seems ridiculously low for

"excruciating" pain. On the other hand, one explanation for this result might be the medical fact that excruciating pain tends to last a far shorter time, on the average, than a mild or cyclic pain, so that a duration-of-pain measure alone might be expected to reflect the less-severe forms of pain. The result might also have been affected by the number of cases where the duration was missing in the judges' reasons and set arbitrarily at one year, which is a comparatively short time. Yet even on this calculation, little Elaine Teno, who could expect pain or discomfort for much of her 70-odd year life expectancy, would receive something like $43,000 for this injury alone!

Finally, we must address the variables which were not found to be significant in determining the level of award for non-pecuniary loss. There are two reasons why a variable might not be found significant in such a study: (1) that the injury or characteristic represented by the variable really does carry no significant weight in the decision on how high the award is and (2) that there were not enough occurrances of the variable in the data set to cause it to be factored into the regression equation. In the absence of further information, which reason applies in respect of a given variable must be largely a matter of judgment.

Mental and emotional damage (PSYC and MIND) surely seem to make a significant impression upon the judges merely from reading their reasons. Their absence from the list of significant variables is quite surprising. Yet, along with inability to drive a car, intensity of pain, poor improvement prospects, likelihood of further treatment, hospitalisation, sex dysfunction and loss of recreations, these injuries tend to be associated with the more significant injuries of paralysis, incontinence, disfigurement, inability to work and inability to live at home, which would tend to knock these variables out of the regression equation. Again, if this shows anything, it shows that the practice of the judges is quite effective at avoiding double compensation for related injuries.

The authors are happy to note that irrelevant considerations like the sex of the plaintiff or the location of the court are not shown significant in the calculation of damage awards. As noted in the text, the Supreme Court of Canada's judgements do not seem to be directly relevant either.

In summary, the study seems statistically valid and the results seem both logically and legally justifiable. The authors conclude that the regression technique is a useful tool for analysis of unreasoned or partially-reasoned legal decisions and note the logic and sophistication with which Canadian judges seem to be administering their informal tariff of awards within the global "non-pecuniary loss" head.

Appendix B

MODEL 1

R-square = 0.72152567

	DF	Sum of Squares	Mean Square	F	Prob > F
Regression	9	92621166195.128	10291240688.348	26.20	0.0001
Error	91	35747330484.080	392827807.51736	—	
Total	100	128368496679.21			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob > F
INTERCEP	31495.87305295	5921.16196805	11114646223.106	28.29	0.0001
AGE	-579.00894122	131.68571227	7594434649.5067	19.33	0.0001
QUAD	70835.14989048	14917.73414033	8857152687.5789	22.55	0.0001
PARA	30034.62200024	6399.09481931	8653852193.7740	22.03	0.0001
CONT	22864.71496381	6881.23815043	4337111923.0149	11.04	0.0013
NWORK	16088.57393744	6707.09899804	2260309400.1970	5.75	0.0185
PWORK	25009.19617177	4491.11160113	12181309986.584	31.01	0.0001
DISFEM	15055.03280337	5148.10069842	3359476201.0191	8.55	0.0044
HOME	23915.29109713	7675.17939582	3813963175.3080	9.71	0.0025
LPAI	11.93693353	4.13122522	3279669116.0124	8.35	0.0048

MODEL 2 **R-square = 0.88300817**

	DF	Sum of Squares	Mean Square	F	Prob > F
Regression	10	273551357381.43	27355135738.143	68.68	0.0001
Error	91	36243462039.567	398279802.63261		
Total	101	309794819421.00			

Variable	Parameter Estimate	Standard Error	Type II Sum of Squares	F	Prob > F
AGE	-548.19421721	129.80380062	7103663254.6322	17.84	0.0001
QUAD	70920.71956792	15021.94045205	8877332318.3277	22.29	0.0001
PARA	30299.80173023	6438.96821845	8819323914.1313	22.14	0.0001
CONT	22546.96455474	6932.42760171	4213022339.0777	10.58	0.0016
NWORK	16136.87549853	6754.35183405	2273316066.2969	5.71	0.0190
PWORK	24754.55527299	4552.33666720	11776867655.701	29.57	0.0001
DISFEM	14898.86752871	5190.59888706	3281405200.7329	8.24	0.0051
HOME	24173.79013035	7724.84746310	3900299461.1971	9.79	0.0024
LPAI	11.81653098	4.16681581	3203020156.9408	8.04	0.0056
YEAR	379.21578678	73.44270509	10618514667.619	26.66	0.0001