

NOTE TO USERS

This reproduction is the best copy available.

UMI[®]

**ACHIEVEMENT, NEED AND THE DISTRIBUTION OF SCARCE
RESOURCES**

A thesis submitted to
the Faculty of Graduate Studies and Research
in Partial Fulfillment of the requirements for the degree

Masters of Arts

by

CLAUDIA ROCCA

Department of Psychology
Carleton University

January 7, 2010

©2010 Claudia Rocca



Library and Archives
Canada

Published Heritage
Branch

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque et
Archives Canada

Direction du
Patrimoine de l'édition

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file *Votre référence*
ISBN: 978-0-494-64455-3
Our file *Notre référence*
ISBN: 978-0-494-64455-3

NOTICE:

The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

AVIS:

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protègent cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.


Canada

Distributing Limited Resources

Abstract

My study investigated what rules people use to allocate a limited resource. I asked 64 undergraduates (32 females and 32 males) to complete two money allocation tasks: (1) allocating scholarship money to scholarship applicants according to information about the applicants' grade point average (an indicant of achievement); (2) allocating bursary money according to information about the size of applicants' student loans (an indicant of need). The amount of money available for allocation (\$10,000 versus \$40,000) and the number of applicants (8 versus 32) were varied. The findings indicate that rewards (scholarships) distributed for achievement are concentrated more than are rewards (bursaries) distributed for need. This difference was amplified when distributing \$10,000 rather than \$40,000, and when distributing among 8 applicants rather than 32. Results indicate people use different rules for allocating resources according to achievement than for allocating for need.

Acknowledgements

I wish to extend a special thank you to all the people who have helped in making this dream a reality. In particular, I would like to thank my supervisor, Warren Thorngate, for his guidance and support, and for having given me the opportunity to explore such an interesting topic. But most of all, Grazie per aver creduto in me Warren!

I would like to thank the members of my committee, Dr Kristiansen, Professor Harada and Dr Wang for their comments and suggestions.

I wish to thank my fellow colleagues and friends, Mahin, Steve, Jing, Lisa and Francesca. It has been such a pleasure to work with all of you.

And finally I would like to thank i miei cari genitori, grazie mamma e papa', my husband Gaetano and my four children, Francesca, Elizabeth, Annamaria and Giovanni. Thank you for having walked by my side while bringing this project to completion. Grazie di cuore!

“You are never too old to set another goal or to dream a new dream” (C.S. Lewis)

Claudia Rocca

January, 2010

Table of Contents

Abstract	ii
Acknowledgements	iii
Achievement, Need and the Distribution of Scarce Resources	1
<i>Some definitions</i>	3
<i>Achievement versus Need</i>	6
<i>Abundance, Scarcity and Allocation Rules</i>	8
<i>Cognitive load</i>	10
<i>Gender and Cultural Differences</i>	11
<i>Research overview, design and predictions</i>	14
Method.....	16
<i>Participants</i>	16
<i>The Questionnaires</i>	16
<i>Research design</i>	17
<i>Generating the grade point averages and loan amounts</i>	18
Procedure.....	19
Results	20
Discussion	35
<i>Limitations</i>	41
<i>Implications</i>	41
References	43

List of Figures

Figure 1: Average COF Index for Scholarship allocations.....	25
Figure 2: Average COF Index for Bursary allocations.....	25
Figure 3: Average proportion of applicants (POA) receiving scholarships.....	27
Figure 4: Average proportion of applicants (POA) receiving bursaries.....	27
Figure 5: Distribution of \$10,000 to Eight Applicants.....	30
Figure 6: Distribution of \$40,000 to Eight Applicants.....	30
Figure 7: Distribution of \$10,000 to 32 Applicants.....	31
Figure 8: Distribution of \$40,000 to 32 Applicants.....	32

List of Tables

Table 1: COF and POA indices for Mary and John's allocations.....	22
Table 2: Analysis of Variance for the Concentration of Funds (COF) index.....	24
Table 3: Analysis of Variance for the Proportion of Applicants (POA) index.....	26
Table 4: Mean Concentration of Funds (COF) index.....	28
Table 5: Mean Proportion of Applicants (POA) index.....	29

List of Appendices

Appendix A: Self-Construal Scale.....	46
Appendix B: Personal Attributes Questionnaire.....	47
Appendix C: Background Questions.....	48
Appendix D: Scholarship Allocation.....	49
Appendix E: Bursary Allocation to be included.....	50
Appendix F: Recruiting Announcement on Experiment Management System (SONA)..	51
Appendix G: Informed Consent.....	52
Appendix H: Debriefing.....	53

Achievement, Need and the Distribution of Scarce Resources

Each day, hundreds of thousands of competitions are held in every society to determine who will get what amounts of limited resources. The resources include everything from audiences to jobs, parking spaces to presidencies, trophies to transplants, research grants to recording contracts. Most of these competitions have rules governing how winners and losers should be chosen, and how the resources should be distributed among them. Debates about these rules form the bulk of a large literature on procedural and distributive justice (see Frohlich, 2007; Homans, 1961; Lind & Tyler, 1988). The purpose of my thesis research is to examine some of the psychological factors that might contribute to judges' selection of these rules.

Suppose a university gives one of its professors a pile of 25 applications from students seeking a scholarship and asks her to distribute a sum of money among the applicants according to their achievement. How would she accomplish the task? Would she, for example, give all the scholarship money to the one or two or three highest achievers and nothing to the rest? Would she divide the money equally among all 25 applicants? Or would she distribute it in proportion to some judgment of their relative achievement? Would she use the same rule if asked to distribute an equal amount of money for bursaries according the applicants' needs for funding? And would she change rule if she was asked to judge 50 rather than 5 applicants? My research attempted to answer these questions.

I was inspired to undertake the present research after discussing scholarship and bursary applications with fellow students. Many of us wondered why most scholarship

competitions award large scholarships to a few students -- a variation of the *winner-take-all* rule (Frank & Cook, 1995) -- rather than small scholarships to many students. In contrast, most bursary competitions award small bursaries to many students, either an equal bursary for each -- a variation of the *equality* rule (Cook & Hegtvedt, 1983) -- or one sized in proportion to need. Why, we asked, are scholarships seemingly allocated differently than are bursaries? The rules governing scholarship and bursary allocations seem to be set by mimicry or tradition. Most judges are simply told that scholarships or bursaries must be allocated in some prescribed way, for example, that there can be only one winner of a scholarship competition and that the winner will receive all available funds. But what if judges were allowed to invent their own allocation rules? Would the rules vary according to characteristics of the judge or the situation?

Just as the prescriptions of mathematical economics do not describe real economic behaviour (see Baron, 2000; Kahneman, 1974, Kahneman, Slovic & Tversky, 1982), the rules prescribing most scholarship and bursary competitions may not describe how people prefer to allocate scholarship or bursary funds. Discrepancies between prescriptions and descriptions are likely to influence perceptions of the fairness or justice of competitions, and these perceptions, in turn, may influence who enters competitions. It would be useful to learn what rules prospective entrants would themselves use to make fair allocations of limited resources if given the opportunity to do so. I thus asked university students to decide which applicants for scholarships and for bursaries should receive how much of a scholarship or bursary fund. The primary purpose of my proposed thesis research was to determine the characteristics of rules people use to allocate scholarships and bursaries when given an opportunity to do as they wish. My second purpose was to determine if the

rules they use vary according to (1) amount of money available to allocate, and (2) the number of applicants. The results shed light on more general ideas of procedural and distributive fairness and justice (see Cook & Hegtvedt, 1983).

Some Definitions

Most psychological literature related to the distribution of limited resources comes from theories and research about justice and fairness, achievement and need, and equity and equality. The definitions of these terms are not always consistent or clear in the literature. For example, the concepts of *equity* and *need* are often lumped into the category of distribution rules, even though equity normally refers to the amount of an allocated resource and need refers to one criterion by which the amount is decided.

To clarify some of the common terms, it is useful to consider Thorngate, Dawes and Foddy's (2009) description of the three stages of an adjudication to determine how a limited resource shall be distributed. In the first stage of the adjudication, prospective applicants for a limited resource are assessed for *eligibility*. Examples include an age test for eligibility to apply for a driver's license, and a student enrolment test to apply for a student scholarship or bursary. Judges assess only prospective applicants who pass the test of eligibility; those who do not pass the eligibility test are ignored.

In the second stage of adjudication, information submitted by eligible applicants is assessed for its *merit*, a judge's assessment of how much an applicant deserves or merits the resource. Judges use a wide variety of information to assess merit. In many adjudications merit is judged by indicators of *achievement*. Thus, the merit of sales staff is often assessed by their sales records; the merit of talent show contestants is often assessed

by the quality of their performance; the merit of scholarship applicants is traditionally assessed by their previous grades and by letters of recommendation.

In many other adjudications merit is judged according to *need*. The merit of an application for welfare, for example, is often assessed by the difference between income and living expenses, and by the number of dependents. The merit of appeals for the time of an emergency room doctor is usually assessed according to the severity of the medical condition (triage). Merit can also be assessed according to various combinations of information about achievement and need. Combinations indicating high achievement and low need, or low achievement and high need, are often difficult to assess.

In the third stage of adjudication, judges allocate different amounts of the available resource according to the merit they assessed in the second stage. This allocation can be done in hundreds of different ways. At one extreme, the distributor or *allocator* can give all the resource to the most meritorious applicant, or to a few of the most meritorious applicants (for example, 1st, 2nd and 3rd prizes) and none to the rest. This is known as a *winner(s)-take-all* (WTA) rule (see Frank & Cook, 1995). At the other extreme, the allocator can give an equal amount to every applicant, in effect ignoring their merit. This is known as the *equality* rule (Cook & Hegtvedt, 1983).

Between the two extremes of winner-take-all and equality rules lies a continuum of other possible distributions, some of which are called *equitable*. One flavour, popularized by Adams (1965), allocates a resource in proportion to merit -- I call it the *proportional equity rule*. The boss of Mary and John who, for example, decides that a budget of \$300 for Christmas bonuses should be allocated in proportion to extra hours spent at work (one definition of merit), would likely assess Mary's 20 extra hours to be

twice as meritorious as John's 10 extra hours. If the boss then employed the proportional equity rule, Mary would receive \$200 of the bonus and John would receive \$100.

Similarly, if two families came to a free Christmas dinner for the needy, those who served the food according to the proportional equity rule would give John's family of six 60% of a turkey and give Mary's family of four the remaining 40%.

The proportional equity rule is clean and simple, but it is difficult to employ when proportions cannot be assessed. Suppose, for example, that an allocator must determine how much of a \$10,000 budget for teaching grading assistance should go to two applicants: Carol, who has a grade point average of A- from Concordia University, and Bill, who has a grade point average of C+ from McGill. Is Carol twice as meritorious as Bill? Three times as meritorious? Or is Bill 1.7, 2.1 or 3.4 times as meritorious as Carol? There is, of course, no simple answer. So a judge who wants to distribute the budget equitably might abandon the proportional equity rule for a more relaxed *ordinal equity rule*. The ordinal equity rule simply states: the more the merit, the more the money (or other divisible resource). Thus, if merit is assessed only by considering grades and not university reputation, and if an ordinal equity rule is applied, any distribution of the \$10,000 that gave Carol more than Bill – \$6,000 to Carol and \$4,000 to Bill, \$9,300 to Carol and \$700 to Bill, etc. – would be considered ordinally equitable.

Equality, proportional equity, ordinal equity, and winners-take-all allocation rules represent points on a continuum of what I call resource dispersion versus concentration. The equality rule produces maximum dispersion of a resource; everyone gets the same amount. The winner-take-all rule produces maximum concentration; the winner gets everything. Between these extremes are the proportional equity, ordinal equity, dozens of

their variations, and other rules as well. As a result, my research questions about which rules allocators use, and how the rules might change with situational and task variables, can be expressed more succinctly: *What influences the extent to which allocators concentrate versus disperse a divisible resource among those who want it?*

One variable that might affect the concentration versus dispersion of resource allocations is achievement versus need; perhaps allocations for achievement (scholarships in my study) are more concentrated than allocations for need (bursaries in my study). A second variable is the amount of a resource; perhaps allocators concentrate their allocations more when there is little supply relative to demand than when there is abundant supply relative to demand. A third variable is the number of applicants; perhaps an allocated resource is more concentrated when many people apply for it than when few do. Each of these is discussed below.

Achievement versus Need

The best athletes, the smartest students, the most important publications, and the most productive employees are examples of achievement-based allocations, while distributions of food to the poor or shelter to the homeless are examples of need-based allocations. Research shows judges tend to distribute resources equitably among applicants in the context of achievement (Adams, 1965; Kan, O'Leary, Krulewitz & Lamm, 1980; Matania & Yaniv, 2007; Miller, 1992; Steiner, 1972). For example, Stake (1983) showed that allocators instructed to consider increasing productivity gave greater allocations to more productive workers. Also, allocators rewarded workers not only according to work produced but also according to what they were capable of producing in

the future. Many other examples can be found outside the lab. Consider, for example, how the winnings of professionals vary according to their rank order in competition.

In contrast to achievement, judges tend to distribute resources equally in the context of need (Lerner, 1974; Mikula, 1974). Studies examining participants' preferences for various allocation rules in the context of need show that judges lean towards rules of distribution that guarantee a minimum compensation for everyone (Frohlich & Oppenheimer, 1990). In a study asking participants to allocate funds to hypothetical welfare applicants, for example, Mitchell et al. (1993) found that allocators attempt to give enough funds to keep each applicant above the poverty line. Similarly, Skitka and Tetlock (1991) found that, at least when money is abundant, allocators of health care and welfare distribute the resources equally among applicants regardless of the person's responsibility for the need.

Why the difference between need and achievement in resource allocation rules? Perhaps the task of distributing a resource to the needy makes people feel more compassionate or empathetic than the task of distributing the resource to the greedy, or at least to the greedy achievers. Perhaps relative need is harder to assess than is relative achievement. The research literature provides little insight into the reasons for this difference. Still, the results suggest that resource allocations will be relatively more concentrated when judging merit according to achievement than when judging merit according to need.

Abundance, Scarcity and Allocation Rules

Casual observation suggests that the differences between allocation rules for achievement versus need seem to hold true mainly when resources are, if not sufficient for all, at least relatively abundant. When resources become scarce, allocators may become more selective in their judgements, giving more to those who achieve the most or need it the most. There is considerable anecdotal evidence for this. Rich employers, for example, might offer jobs to their seven best job applicants if they have seven jobs, but are unlikely to offer 1/7 of a job to the same applicants if only one job is available. Busy doctors are likely to give a higher proportion of their limited time to those with more serious medical needs than are doctors with time to spare. Such anecdotes are reminiscent of Hardin's (1968) "Tragedy of the Commons" and Spencer's "Survival of the Fittest."

I was unable to find studies examining how scarcity might affect the distribution of resources in contests of achievement. Perhaps in contests of achievement judges will choose different allocation rules according to any of several conditions. For example, allocators might be generous in allocating a resource, giving to all meritorious applicants, when funds are abundant. On the contrary, they might be more selective when funds are scarce, giving most of all the funds to the one or two most meritorious applicants.

I did find studies examining how scarcity might affect distribution of resources in the context of need. For example, studies conducted in the context of need show that when resources become relatively scarce, allocators become more interested in assisting the neediest applicants therefore distributing resources in a more equitable rather than equal fashion. When resources are scarce, allocators provide assistance to applicants who

are not responsible for their own predicament and deny it to those they perceive to have caused their own misfortune (Skitka & Tetlock, 1991, Study 1).

Skitka and Tetlock (1991) proposed a four-stage model of resource allocation that delineates how the availability of the resource – abundance vs. scarcity – might affect the process of distribution. Overall, Skitka and Tetlock postulated that, in situations of scarcity, allocators become cautious in the way they distribute resources among applicants. They assess the cause of the need and prioritize the distribution of the resource according to need and deservingness of the applicant. In the first stage of Skitka and Tetlock's (1991) model, allocators assess the resource availability; if there are enough resources for all applicants, then they distribute them equally to all applicants. If resources are scarce, allocators move to stage two, making an attributional analysis of applicants' responsibility for the need, and distributing resources only to those judged not responsible for their need.. In the third stage, allocators make an assessment of the deservingness of applicants who remain. In the last stage allocators set priorities based on the cause of need and deservingness. Applicants with the highest priority receive aid.

Skitka and Tetlock (1991) conducted two studies to test the validity of their model. In Study 1, they investigated allocation preferences in conditions of low and high scarcity; in Study 2 they examined allocation preferences in conditions of no scarcity. Participants in both studies were asked to play the role of a decision-maker responsible for the allocation of medications for AIDS victims, organs for organ transplants and low-income housing for the poor. Their task was to fill out a number of questionnaires containing a description of the resource to be allocated, a description of the applicants' need, and the availability of the resource. Results confirmed the predictions made in the

4-stage model. Allocators assessed the cause of the need, the applicant's deservingness and the availability of the resource in order to make allocation decisions.

Both studies show that when resources become scarce, judges shift from an equality rule towards an equity rule – from dispersing the resource to concentrating it on those most deserving. My proposed research will attempt to replicate this finding, and determine whether the distribution of a resource allocated according to achievement, as well as according to need, will change their concentration versus dispersion as the amount of the resource rises or falls.

Cognitive Load

Relative abundance versus scarcity of a resource can be varied in two ways: (1) by changing the amount of the resource, and (2) by changing the number of people who seek it. There is no mathematical difference between the two. There is, however, a distinct psychological difference. Consider, for example, two so-called equivalent tasks: (1) allocating \$10,000 of scholarship or bursary money among eight applicants; (2) allocating \$40,000 in scholarship or bursary money among 32 applicants. The two tasks have equal relative scarcity: \$1,250 per applicant. Yet the latter task requires much more cognitive processing, simply because there is four times as much information to process. There are limits to the amount of information people can process (Miller, 1956), and this might affect their allocation rule.

Studies in cognition show that people have a tendency to ignore much information available to them, especially when the amount of information exceeds their information processing capacity (Tversky & Kaheman, 1973). The resulting selective ignorance is manifested in many situations ranging from channel surfing, to assessing political

candidates, to judging applicants for research grants (Thorngate, Dawes & Foddy, 2009; Thorngate & Maki, 1976). It takes less cognitive capacity to assess a few applicants for scholarships or bursaries than to assess many of them. When judgments require that we process amounts beyond our limits of working memory, attention or fatigue, we seek ways to make the task do-able by either eliminating alternatives as quickly as possible or by ignoring lots of available information.

We might therefore expect that the process by which allocators decide on how much money to give scholarship or bursary applicants would shift as the number of applicants increases, even though relative scarcity remains the same. As noted above, allocating \$10,000 to eight applicants might be a very different task than allocating \$40,000 to 32 applicants, despite the constant relative abundance (\$1,250 per applicant). I expect that when the number of applicants for a scholarship or bursary increases, the cognitive load of the judges will increase and, as a result, the proportion of information allocators examines will decrease. Consequently, fewer applicants will be considered for a scholarship or bursary and a smaller proportion of applicants will receive funding.

Gender and Cultural Differences

Individual and cultural differences may also influence which distribution rule allocators choose. Although individual and cultural differences are not the primary topic of my research, some of the ideas from research on gender and cultural differences in resource allocation are worthy of consideration and led to some testable predictions.

Research examining allocation rules shows that men and women often differ in the rules they use. Most of these differences have been found in studies asking undergraduates to participate in a group task, then to indicate privately their preference

for distributing rewards (usually money) to each group member, including themselves – allocating according to task achievement (e.g., Kan, O’Leary, Krulewitz & Lamm, 1980). Such studies show that women are generally more inclined to allocate the rewards equally among group members, while men are more inclined to allocate the rewards according to an equity rule – usually allocating more for themselves than for others (e.g., Leventhal & Lane, 1970). In studies where the allocator is an observer of the group, rather than a member, gender differences are smaller and less consistent (Kan, O’Leary, Krulewitz & Lamm, 1980).

Most studies of sex differences in allocation rules were conducted over thirty years ago when men were expected to be competitive and dominant while women were expected to be gentle and agreeable. Times have changed, and men’s and women’s roles in the society have also changed. Women especially have assumed roles that were once considered strictly masculine. Men have also changed, although maybe less than women, some now fulfilling roles such as childrearing once considered feminine. These changes may attenuate differences between men and women in their allocation rules, and led me to ask whether women would still disperse funds more equally than would men.

Similar to studies of gender differences, studies of cultural differences in the choice of distribution rules show that people from individualistic cultures generally allocate resources equitably among applicants, while students from collectivist cultures more often allocate resources equally among applicants (e.g., Fischer & Smith, 2003). This led me to examine whether Canadian participants in my study (assumed to be individualistic) allocated money differently than participants coming from cultures known to be collectivist.

There are several ways to test possible gender and cultural differences in the distribution of resources. In consultation with my committee members, I decided, in addition to asking participants to report their gender and ethnic background of their mothers, to administer two questionnaires, the Personal Attributes Questionnaire (PAQ) (Spence & Helmreich, 1978). and the Self-Construal Scale (SCS) (Singelis, 1994).

Gender and culture may not be the only individual differences influencing the allocation of limited resources. So too, may personal histories. In a study examining whether undergraduate financial aid influenced alumni contributions, Elam, Stratton, Gilbert, Stroth, Vicini and Wilson (2005) found that recipients of scholarships were more likely to make donations than non-recipients. I was interested to learn whether there was a relationship between the number of bursaries or scholarships my participants had themselves received and the concentration of participants' funding allocations.

To summarize, research on distributive justice shows that judges' choice of an equity rule versus an equality rule is influenced by contextual and situational variables, as well as by individual and cultural variables. In the present research I examined how the task, resource scarcity, number of applicants, gender, culture and past experience receiving financial aid influence allocators' choice of an allocation rule. However, contrary to past research examining which rule of distribution – equity or equality – people tend to use when allocating resources, I examined how much people concentrate or disperse resources.

To undertake this examination, I chose to adopt two resource allocation tasks familiar to most students. One is a scholarship allocation task; the other is a bursary allocation task. By tradition, scholarships are given for academic achievement and

bursaries are given for need. These two tasks thus satisfy the requirements for testing my hypothesis that participants will concentrate their allocations more when giving money for scholarships than when giving money for bursaries.

I also hypothesized that, when scholarship and bursary money is abundant, judges will distribute the scholarship money in proportion of the applicant's merit (equity rule) and the bursary money evenly among applicants (equality rule). I also predicted that, when money is scarce, judges would concentrate the scholarship money to the applicants with the highest grade point average (GPA), and would concentrate the bursary money among applicants with the largest student loans.

Research Overview, Design and Predictions

I addressed my hypotheses and research questions by asking participants to make allocations in two hypothetical tasks. Each participant was asked to play the role of a judge with a fixed budget responsible for allocating money for (1) scholarships and (2) bursaries to first year student applicants. I varied the amount of money available and the number of applicants for the money to reflect situations of relative abundance versus scarcity. I measured the concentration versus dispersion of their allocations using one measure of concentration (Standard Deviation of the allocations / SD when one applicant received everything) and one measure of dispersion (% of applicants who received at least \$1).

My experiment followed a 2x2x2 (*Resources x Applicant Numbers x Reason for Applying*) mixed factorial design. *Resources* (\$10,000 vs. \$40,000) and *Applicant Numbers* (8 vs. 32) were the between-subject variables. *Reason for Applying* (Achievement vs. Need) was the within-subject variable. I collected data from 32

participants in each of the four between-subject conditions. I recorded the amount of money each participant allocated to each applicant. From these amounts, I calculated the two indices of concentration versus dispersion and I performed statistical analyses on the concentration-dispersion indices. I predicted the following:

- *Hypothesis 1. Based on research showing more equality when allocating according to need rather than to achievement (Lerner, 1974; Mikula, 1974) I predicted the average concentration of bursary allocations would be less than the average concentration of scholarship allocations.*
- *Hypothesis 2. Consistent with research showing more equality in resource distributions when resources are abundant than when they are scarce (Skitka & Tetlock, 1991), I predicted that the average concentration of scholarship and bursary allocations would be greater when allocating \$10,000 than when allocating \$50,000.*
- *Hypothesis 3. Following research on information seeking under conditions of information overload (Thorngate & Maki, 1976) I predicted scholarship and bursary allocations would show higher concentration when 32 people apply than when 8 people apply.*

The data collected also allowed me to address three research questions.

- *Question 1: Are there gender differences in the concentration versus dispersion of funds?*
- *Question 2: Do people from collectivistic cultures show more dispersion in their funding allocations than people from individualistic cultures?*

- *Question 3: Is there a correlation between the number of scholarships or bursaries the participants have themselves received and the concentration-dispersion of participants' funding allocations?*

Method

Participants

One-hundred and twenty-eight ($N = 128$) undergraduate university students (84 females and 44 males) participated in the study. They ranged in age from 17- 50 years (median = 20 years). All were recruited from the introductory psychology course at Carleton University. All participants were offered a course credit for participation.

The Questionnaires

In order to examine possible relationships between individualism-collectivism (I-C) and the distribution of scholarship and bursary funds, I sought a good indicant of I-C. There is little consensus in the literature about which indicant is most valid so, with the encouragement of my committee, I chose two. The first indicant was indirect; I asked participants to write down the country of origin of their mother. In consultation with my supervisor, we decided mother's origin would best indicate the predominant culture of a participant's home environment, which we could then classify as individualistic or collectivist according to Hofstede's (1972) classification scheme.

The second indicant of I-C was a more traditional psychometric measure: Scores on the 30-item *Self-Construal Scale* (SCS) (Singelis, 1994; see Appendix A). The scale consists of 30 items: 15 Independent items and 15 Interdependent items reflecting individualism and collectivism, respectively.

To test possible gender differences in the distribution of scholarship and bursary funds, I asked participants to report (1) their gender and to (2) complete the 12-item *Personal Attributes Questionnaire* (PAQ Spence & Helmreich, 1978). The PAQ questionnaire (see Appendix B) assumes that communal or egalitarian values reflect a feminine orientation and instrumental or elitist values reflect a masculine orientation. In addition to examining cultural and gender differences in distributing funds, I examined the relationship between participants' previous scholarship and bursary success and their allocation of scholarship and bursary funds. To do so, the background questionnaire asked participants to report the number of scholarships and bursaries they applied for and how many they received.

Research Design

The allocation task. The allocation task included three parts. In the first part, participants were asked demographic questions such as age, gender and information about received scholarships or bursaries (see Appendix C).

Following the demographic information, participants were required to complete two money allocation tasks. One of them asked each participant to allocate scholarship funds (either \$10,000 or \$40,000) to any or all of a set of applicants (8 or 32) based on the applicants' grade point average (GPA) (see Appendix D). The other task asked each participant to allocate bursary funds (either \$10,000 or \$40,000) to any or all of a set of applicants (8 or 32) based on the amount of applicants' outstanding loans (see Appendix E). My experiment followed a 2x2x2 (*Resources x Applicant Numbers x Reason for Applying*) mixed factorial design. *Resources* (\$10,000 vs. \$40,000) and *Applicant Numbers* (8 vs. 32) constituted my two between-subject variables. The two tasks, *Reason*

for Applying (Achievement vs. Need) constituted my within-subject variable. I collected data from 32 participants in each of the four between-subject conditions. In order to control for order effects, half of the participants completed the scholarship task first, then the bursary task. The remaining participants completed these two tasks in the opposite order.

Generating The Grade Point Averages and Loan Amounts

Participants allocating scholarship funds saw on a computer screen a matrix of either 8 or 32 rows (each representing one of the applicants) and three columns. The leftmost column showed the names (all fictitious) of the applicants; half were male names, half were female names and 25% were “foreign” names such as Connie Liu Fung and Mombasu Tomega. The rightmost column was empty; its cells showed the amount of scholarship funds that a participant allocated (see Appendices D & E for screen captures).

The middle column contained the grade point average of each applicant, sorted from highest (row 1) to lowest (row 8 or row 32) GPA. The GPAs were generated by a computer algorithm that approximated a normal distribution with an average = 85% and SD = 5%. The formula was as follows:

$$\text{GPA} = \text{random}(10) + \text{random}(10) + \text{random}(10) + 69$$

As a result, the algorithm did not generate GPAs greater than 99% or less than 69%. About 12% of the applicants had a GPA of at least 90%, about 76% had a GPA in the 80% range, and about 12% had a GPA in the 70% range. To control for confounds, new GPAs were generated for the 8/32 applicants for each participant. This randomization gave each applicant an equal chance having the highest GPA, the 2nd highest GPA, etc.

Participants who judged 32 applicants saw 32 GPAs, almost all between about 96% and 72%. To control for range, participants who judged 8 applicants were shown a stratified sample of 32 GPAs. The highest GPA, 5th highest, 9th, 14th, 19th, 23rd, 28th, and 32nd highest were used for a sample of 32 GPAs to construct the GPAs of 8 applicants.

Thirty-two new names were generated for the bursary allocation task; as in the scholarship task, half the names were of females, and 25% of the names were distinctly foreign. Samples of 32 loans were generated by the following algorithm, similar to that generating GPAs:

$$\text{Loan} = \text{random}(4000) + \text{random}(4000) + \text{random}(4000) + 4000$$

The algorithm produced samples from a distribution with an average of \$10,000 and SD of \$2,000; almost all of the loans ranged from about \$5,000 to \$15,000. As with GPAs, once the loans were generated, they were sorted from largest (row 1) to smallest (row 8 or row 32). Thirty-two loan amounts were generated by invoking the algorithm 32 times. Eight loan amounts were generated by invoking the algorithm 32 times, then selecting the highest, 5th, 9th, 14th, 19th, 23rd, 28th, and 32nd highest to ensure that the range of the eight would be equivalent to the range of the 32.

Procedure

The study was first approved by the Ethics Committee at Carleton University. An announcement for recruitment was then posted on the Carleton University online system (SONA) for scheduling students interested in participating in research studies (see Appendix F).

Upon arrival at the lab, I asked participants to read and sign an Informed Consent form (see Appendix G). I then asked them to fill out the SCS questionnaire and the PAQ

questionnaire followed by the Demographic Questions and the two computer-based allocation tasks (see Appendices D & E for two screen captures of the tasks). Participants then received the Debriefing form (see Appendix J), were thanked and excused. The experiment took about 45 minutes to finish. Each participant received one course credit for participating.

Results

In order to test the three Hypotheses, I first needed to choose useful ways of measuring how concentrated or dispersed were the allocations of scholarships and bursaries. I started by calculating the extent to which participants divided money across many applicants or concentrated the money on a few. To do so, I selected two coefficients of concentration for each participant's scholarship allocation and bursary allocation. There are several coefficients of concentration, including Shannon's H and the Gini Index. In consultation with my supervisor, I decided to employ two believed most suitable for my research; the first is sensitive to the proportion of applicants receiving something versus nothing, the second was sensitive to the relative amounts received by those who did receive something. The first was called a *proportion of applicants* (POA) index measuring the proportion of applicants who received at least one dollar. It was calculated for each participant using the following formula:

$$\text{POA} = (\# \text{ applicants receiving at least } \$1) / (\text{total } \# \text{ applicants})$$

The POA index ranges from $1/\#\text{applicants}$ to 1.0. The higher the POA, the more disperse the funding. A high POA indicates allocation of funds among a high proportion of applicants; a low POA indicates that only a few applicants received funding.

My second measure of concentration versus dispersion of funds was called the concentration of funds (COF) index. The COF measures the variability of funds allocated across the applicants; the higher the COF, the more concentrated the allocation. It is calculated by dividing the standard deviation of the allocation a participant made by the standard deviation of the most concentrated allocation, in which one applicant gets everything and all the rest get nothing (SDmax). A COF is calculated using the following formula:

$$\text{COF} = \text{SD} / \text{SDmax}$$

The COF index ranges from 0.0 to 1.0. A COF of 0.0 indicates equal dispersion of the funds among the applicants, while a COF of 1.0 indicates complete concentration of all funds in one applicant.

To illustrate the calculation of POA and COF indices, suppose Mary is asked to allocate \$10,000 in scholarship money to ten applicants and John is asked to allocate \$40,000 in scholarship money to eight applicants. Mary decides to allocate her \$10,000 to eight of the ten applicants, concentrating most of the money to the top two. John, on the other hand, decides to allocate his \$40,000 to five of the ten applicants, giving equal amounts to each of them. Table 1 shows how the POA and COF indices are calculated.

Table 1:

COF and POA Indices for Mary and John's Allocations

	Mary		John	
	\$10,000 to 10 applicants		\$40,000 to 10 applicants	
Applicant	Mary's allocation	Max concentration	John's allocation	Max concentration
A	6000	10000	8000	40000
B	2000	0	8000	0
C	1000	0	8000	0
D	400	0	8000	0
E	400	0	8000	0
F	100	0	0	0
G	50	0	0	0
H	50	0	0	0
I	0	0	0	0
J	0	0	0	0
SD =	1866		4216	
SDmax =		3162		12649
COF =	0.59		0.33	
SD/SDmax				
POA = # given money/#people	0.80		0.62	

Recall the three main hypotheses of my research|:

- *Hypothesis 1. The average concentration of bursary allocations will be less than the average concentration of scholarship allocations.*

- *Hypothesis 2. The average concentration of scholarship and bursary allocations will be greater when allocating \$10,000 than when allocating \$40,000.*
- *Hypothesis 3. Scholarship and bursary allocations will show higher concentration when 32 people apply than when 8 people apply.*

These hypotheses lead to the following three statistical predictions:

- There will be a significant main effect for *Reason for Applying* (Achievement vs Need) on the COF and the POA indices. The average COF index will be higher in the scholarships allocation task than in the bursary allocation task; the average POA index will be higher in the bursary allocation task than in the scholarships allocation task.
- There will be a significant main effect for *Resources* on the COF and POA indices. The COF index will be higher when allocating \$10,000 than when allocating \$40,000; the POA index will be higher when allocating \$40,000 than when allocating \$10,000.
- There will be a significant main effect for *Applicant Numbers* on the COF and POA indices. The COF index will be higher when allocating to 32 people than when allocating to 8 people; the POA index will be higher when allocating to 8 people than when allocating to 32 people.

I conducted two 2x2x2 ANOVAs to test these predictions, one for the COF index and one for the POA index. Table 2 reports the results for the COF ANOVA; Figures 1 and 2 show the average COFs. Table 3 reports the results for the POA ANOVA; Figures 3 and 4 show the average POAs.

Table 2:

Analysis of Variance for the Concentration of Funds (COF) Index

<i>Source</i>	<i>df</i>	<i>F</i>	<i>p</i>
Between Subjects			
Resources (R)	1	11.61	.00
Applicant Numbers (A)	1	11.15	.00
R x A	1	.34	.56
A within-group error	124	(.01)	
Within Subjects			
Type of Application (T)	1	29.447**	.000
T x R	1	.084	.773
T x A	1	.068	.795
T x R x A	1	.133	.716
T x R within-group error	124	(.016)	

Figures 1 and 2:

Average COF Index for Scholarship allocations Average COF Index for Bursary allocations

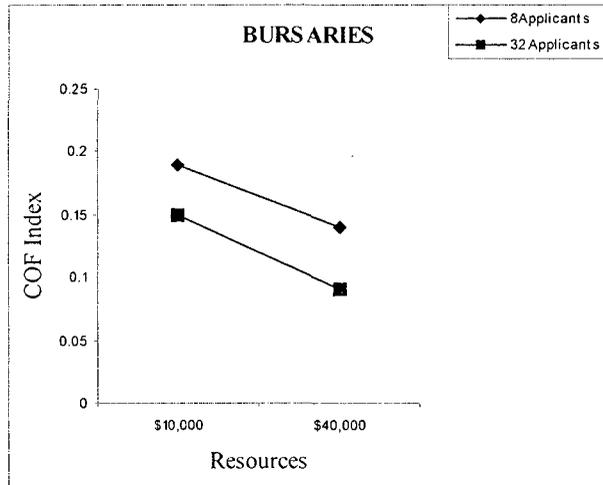
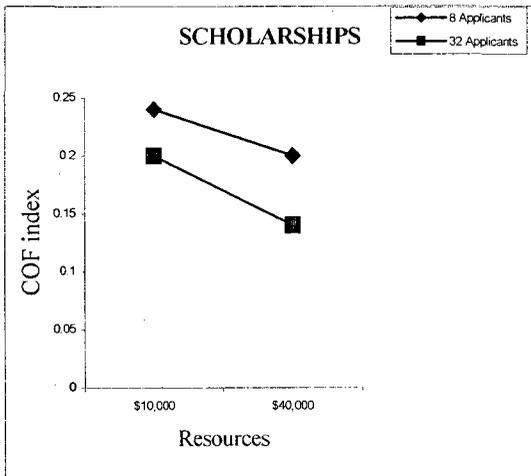


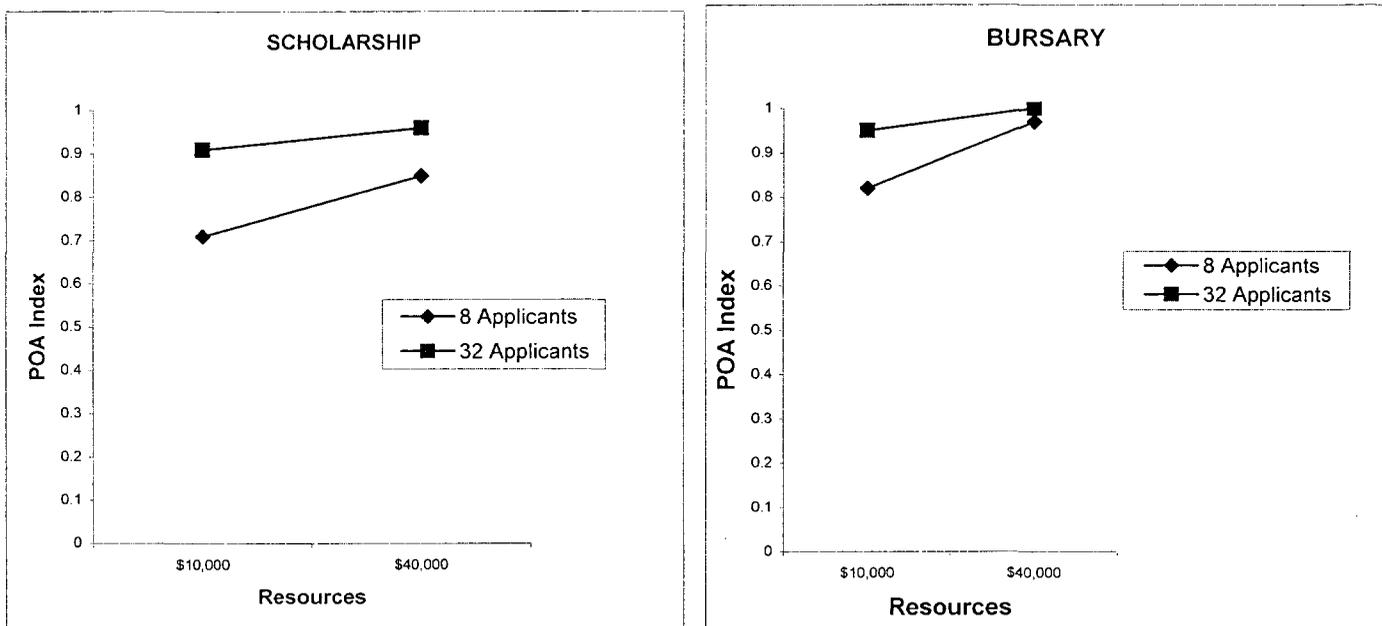
Table 3:

Analysis of Variance for the Proportion of Applicants (POA) Index

<i>Source</i>	<i>df</i>	<i>F</i>	<i>p</i>
Between Subjects			
Resources (R)	1	12.77	.00
Applicant Numbers (A)	1	18.18	.00
R x A	1	2.93	.02
A within-group error	124	(.01)	
Within Subjects			
Type of Application (T)	1	21.58	.00
T x R	1	.00	.96
T x A	1	5.57	.02
T x R x A	1	.02	.86
T x R within-group error	124	(.05)	

Figures 3 and 4

Average proportion of applicants (POA) receiving scholarships and bursaries



Supporting Hypothesis 1, the average COF (Table 2; Figure 1) and POA (Table 3; Figure 3) for the scholarship allocation was significantly higher than the average COF (Table 2; Figure 2) and POA (Table 3; Figure 4) for the bursary allocation.

Hypothesis 2 was also supported; as seen in Tables 2 and 3 and Figures 1 to 4. There was a significantly higher COF and lower POA when allocating \$10,000 than when allocating \$40,000.

Hypothesis 3, however, was disconfirmed. As Tables 2 and 3 and Figures 1 through 4 show, the average COF was significantly higher, and the average POA was significantly lower, when allocating to 8 participants than when allocating to 32 participants in the scholarship and bursary conditions. In short, there was more

concentration and less dispersion of funds in a few applicants when the number of applicants was small than when the number was large. This is contrary to the predictions of Hypothesis 3.

Was it also contrary to the predictions following from ideas about cognitive load? The main effect of applicant numbers could have been due to two factors: (1) the number of applicants, and (2) the relative scarcity of resources that the greater number brings. Consider, for example, the differences between allocating \$10,000 to 8 applicants versus 32 applicants. Certainly the applicant numbers change; assessing 32 applicants presumably requires more cognitive load. But the former task would give each of the 8 applicants an average of \$1,250, while the latter task would give each of the 32 applicants an average of only \$312.50. So the difference in concentration could be due to one or both of these factors.

Fortunately, two of the four experimental conditions controlled for the average amount per applicant. By comparing the \$10,000 for 8 applicants condition with the \$40,000 for 32 applicants condition, I was able to hold the money per applicant constant. I conducted four t-tests to compare these two groups, two for the average scholarship and bursary COFs and two for the average scholarship and bursary POAs. The results are presented in Tables 4 and 5, respectively.

Table 4:

Mean Concentration of Funds (COF) Index

	\$10,000 to 8 Applicants	\$40,000 to 32 Applicants	<i>t</i> (63)	<i>p</i>
Scholarships	0.24	0.13	3.60**	0.00
Bursaries	0.19	0.08	4.51**	0.00

Table 5

Mean Proportion of Applicants (POA) index				
	\$10,000 to 8	\$40,000 to 32		
	Applicants	Applicants	t(63)	p
Scholarships	0.91	0.85	1.41	0.16
Bursaries	0.95	0.87	0.63	0.53

The results shown in Tables 4 and 5 indicate that, when amount of funds per applicant is controlled, a significant COF still emerges. This lends credence to the proposition that cognitive load is playing some role in the allocation rule chosen.

Surprisingly, however, the rule gives a wider dispersion of money to 32 applicants than to 8 – contrary to the idea that cognitive load is managed by ignoring most of the applicants.

I also examined one additional indicator of the concentration of allocations. For each of the $2 \times 2 \times 2 = 8$ experimental conditions, I calculated the proportion of the available money that was given, on average, to the applicant with the highest grade or loan, the second highest grade or loan, etc. The results are plotted in Figures 5 to 8.

Figure 5: Distribution of \$10,000 to Eight Applicants

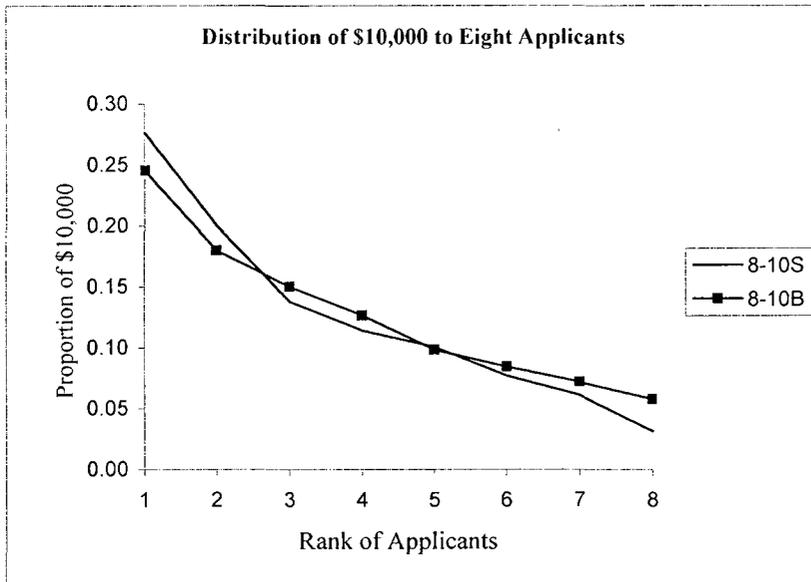


Figure 6: Distribution of \$40,000 to Eight Applicants

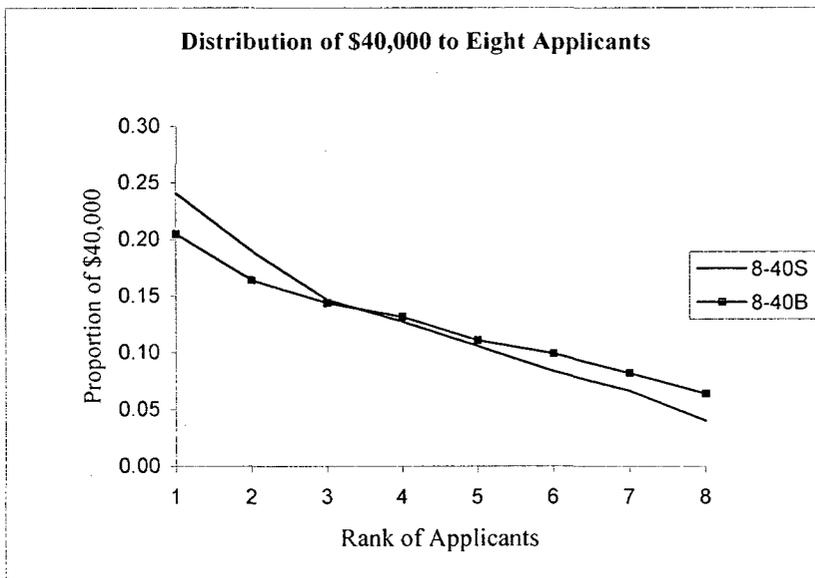


Figure 7: *Distribution of \$10,000 to 32 Applicants*

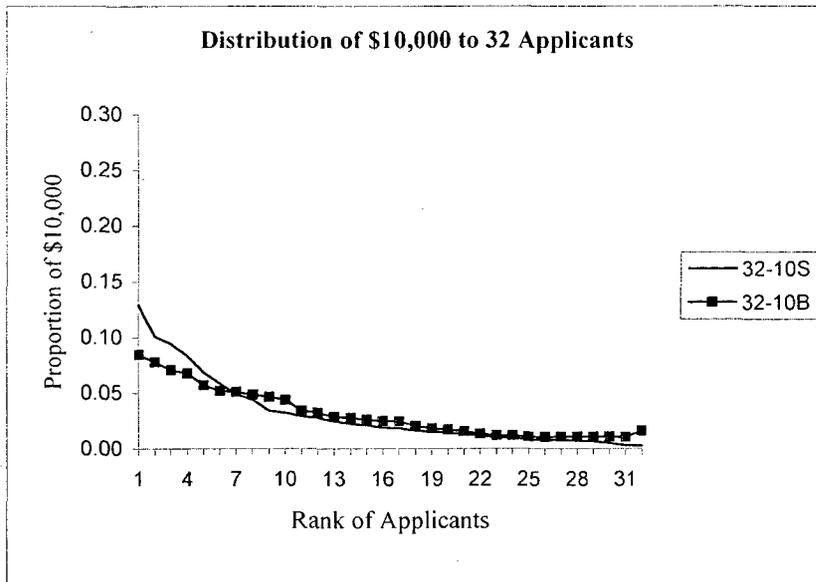
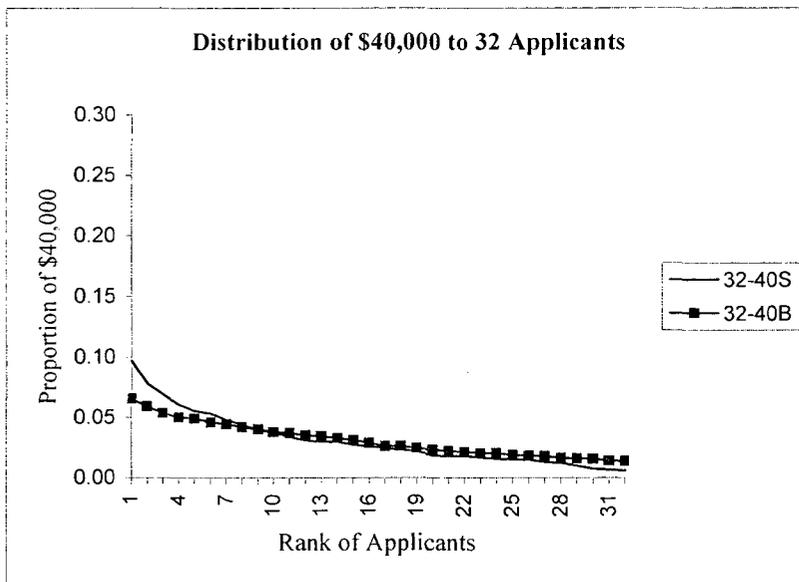


Figure 8: Distribution of \$40,000 to 32 Applicants



Visual inspection of Figures 5 through 8 reveals a very consistent finding. All the plots in the figures are monotone decreasing; the lower the rank of the applicant, the less money he/she receives. This is consistent with an ordinal equity allocation rule.

Individual Differences

Recall the 3 exploratory questions of my research:

- *Question 1: Are there gender differences in the concentration versus dispersion of funds?*
- *Question 2: Do people from collectivistic cultures show more dispersion in their funding allocations than people from individualistic cultures?*
- *Question 3. Is there a correlation between the number of scholarships or bursaries the participants have themselves received and the concentration-dispersion of participants' funding allocations?*

To answer Question 1, I first conducted 4 t-tests on the COF and POA indices for male and female participants in each of the 4 conditions (32 participants per condition). The results showed no significant gender differences in both the COF and POA indices. Also there was no significant relationship between PAQ instrumentality scores and the scholarship or bursary COF indices ($r(126) = 0.6, p = 0.45$ for scholarship; $r(126) = 0.04, p = 0.64$ for bursary) and no significant relationship between PAQ communalism scores and the scholarship or bursary POA indices ($r(126) = 0.05, p = 0.59$ for scholarship; $r(126) = 0.12, p = 0.16$ for bursary).

I addressed Question 2 by correlating the Self-Construal scale measures with COF and POA indices of concentration/dispersion. There was no significant relationship between independence and the scholarship or bursary COF indices ($r(126) = 0.5, p = 0.56$ for scholarship; $r(126) = 0.00, p = 0.94$ for bursary). Neither were there significant relationships between interdependence and the POA indices ($r(126) = 0.00, p = 0.94$ for scholarship; $r(126) = 0.02, p = 0.80$ for bursary).

Do people from collectivist cultures show more dispersion in their funding allocations than do people from individualistic cultures? I examined mother's country of origin as a rough measure of cultural background. The mothers of 58 participants were born in Canada; these participants were classified as native Canadians and assumed to be individualistic in their cultural patterns. The remaining 70 mothers were born in other countries. Of these, 28 came from known collectivist cultures (Hofstede, 1972): 13 from China, four from India, three from Jamaica, and two each from Korea, Nepal, Iran and Vietnam. The 28 participants with these mothers formed my collectivist culture group.

I conducted two t-tests to determine if the 28 participants from collectivist cultures distributed scholarship or bursary money differently than did the 58 individualist participants. The results showed a significant difference in the scholarship COF index between collectivists and individualists, $t(84) = 2.17, p = 0.03$. Similarly, significant differences between collectivists and individualists were found in the bursary COF index, $t(84) = 1.92, p = 0.03$. Surprisingly, and contrary to expectations, participants from collectivist cultures concentrated scholarship funds (mean COF = 0.25), and bursary funds (mean COF = 0.18) more than did participants from individualistic cultures (COF scholarships = 0.17; COF-bursaries = 0.13). The POA index, on the other hand, showed no significant differences. Participants from collectivist cultures dispersed scholarship funds (mean POA = 0.86) about the same as participants from individualistic cultures (POA scholarship = 0.84), $t(84) = 0.18, p = 0.86$. Similarly collectivists distributed bursary funds (mean POA = 0.88) about the same as did individualists (POA bursary = 0.94), $t(84) = 1.24, p = 0.22$.

Why would collectivists concentrate resources more than would individualists? A hint came from an additional analysis. Levene's test for equal variances showed that collectivist participants had significantly higher variability in their concentrations of scholarship ($SD = 0.18$) and bursary ($SD = 0.14$) funds than did my individualistic participants (SD –scholarship = 0.09 ; SD -bursary = 0.06), $F(84) = 8.34, p < 0.01$, and $F(84) = 6.12, p < 0.02$ respectively. The collectivist participants, far from being as homogenous as the individualists, tended toward extreme concentration or extreme dispersion.

Were the collectivists who concentrated their allocation from a particular collectivist culture? I examined the family origins of the 14 collectivists scoring highest in concentration and on the other 14 scoring lowest in concentration. Visual inspection of the mothers' country of origin showed no relationship between country and concentration. For example, of the 13 Chinese, six scored above the median in concentration and seven scored below.

Is there a relationship between the number of scholarships or bursaries the participants have themselves received and the concentration of participants' funding allocations (Question 3)? I asked participants how many scholarships or bursaries they had applied for and how many scholarships and bursaries they had received. The eight correlations between these two numbers and the COF/POA indices were all non significant (the highest of the four was $r(126) = .06, p = 0.45$ on the POA index for scholarship).

I ended my analysis by correlating the two COF indices and the two POA indices (for scholarships and for bursaries) across all participants. The results showed a significant positive correlation, $r(126) = .54, p = .000$. Similarly, the correlations between the scholarship and bursary POAs was $r(126) = .59, p = 0.00$. The results indicate that participants are relatively consistent across the two tasks in how they concentrate or disperse funds among applicants.

Discussion

The first purpose of my research was to examine how people distribute limited resources according to achievement and according to need. I selected grade point averages as an indicant of achievement and size of student loans as an indicant of need,

then gave each research participant two tasks: allocating scholarship funds according to GPA and allocating bursary funds according to size of loans. The second purpose of my research was to determine if the distribution of these funds varied according to sources of relative resource scarcity: (1) the amount of money available (\$10,000 vs. \$40,000), and (2) the number of applicants (eight vs. 32).

The findings indicate that resources (scholarships) distributed for achievement are concentrated more among the highest achievers than are resources (bursaries) distributed among those most in need. This difference in concentration was amplified as scarcity increased, that is, when distributing \$10,000 rather than \$40,000, and when distributing among eight applicants rather than 32.

These results partially support past research. When I varied scarcity by varying money, as did Stitka and Tetlock (1991), holding the number of applicants constant, my results were consistent with Stitka and Tetlock's findings. The COF and POA indices showed greater dispersion of scholarship and bursary funds when distributing \$40,000 rather than \$10,000 regardless of the number of applicants. The result support Hypothesis 2. Participants, it seems, were generous to more people when there was more money to go around

However, when I varied scarcity by varying number of applicants, while holding funds constant, my results only partially supported those of Stitka and Tetlock. A greater proportion of the eight scholarship and bursary applicants received some money than did the 32 bursary applicants, replicating Stitka and Tetlock's results. But the COF index showed the opposite. The concentration of funds among those receiving at least some bursary was higher when allocating to eight bursary applicants than when allocating to

32. One possible reason for this reversal might be related to the cognitive load imposed by the allocation task. This possibility is addressed later in the Discussion.

The rank order of money allocated was consistent with the rank of grade point average and the rank of loans. For example, the applicant with the fifth highest loan was on average allocated the fifth highest bursary, and the applicant with the third highest GPA was allocated the third highest scholarship. The bursary result replicates Stitka and Tetlock's finding that, when resources are scarce, the neediest people are allocated a higher proportion of the resources than when they are abundant. The scholarship result extends Stitka's findings by showing that, when resources are scarce, the highest achievers are also allocated a higher proportion of the resources than when they are abundant.

Although greater scarcity did increase the concentration of funds, it is important to keep this increase in perspective. The COF indices were far closer to 0.0 (maximum dispersion) than to 1.0 (maximum concentration), suggesting that, under all conditions, participants preferred to disperse the funds widely. The POA indices were far closer to 1.0 (all applicants given something) than to its lower bound (one applicant given everything), also suggesting that participants preferred to give something to most applicants. The participants' dispersion of scholarship funds is contrary to the academic tradition of allocating scholarships only to the very few with highest achievement. Perhaps, this is because participants themselves were students and more sympathetic to peers with low grades. However, there was no relationship between the number of scholarships participants had received and their concentration of scholarship funds.

Are allocations influenced by cognitive load? In the introduction I argued that, as the number of applicants increases, so also does the amount of attention that a judge must pay to finishing the task of scholarship or bursary allocation. One means of reducing cognitive load is to eliminate applicants from consideration as quickly as possible. This led to Hypothesis 3 that, when relative scarcity was held constant ($\$10,000$ to eight applicants = $\$40$ to 32 applicants = $\$1,250$ per applicant), a higher proportion of the 32 applicants would receive something than would the 8 applicants.

The results were significant but opposite to the predicted direction; a higher proportion of the 32 applicants received something than did the eight applicants. Why? Perhaps giving something to many people requires no more cognitive load or “effort” than does giving nothing to many people. As a result, participants asked to give money to 32 applicants might find it just as easy to give everyone something as it is to give most nothing. When participants judged eight applicants, perhaps the cognitive load was sufficiently small that they had enough cognitive resources to be more discriminating in their allocations.

To test this explanation, I asked my four children, aged 17 to 24 and all students, to complete two scholarship allocation tasks ($\$10,000$ to 8 and $\$40,000$ to 32) and to tell me the rules they employed to complete both. Their introspections suggest that, instead of searching for the most deserving applicants, they searched for the least deserving applicants, established a cut-off, gave nothing to those below the cut-off, and gave something to everyone above it. In other words, they seemed to be using a “bottom-up” rather than a “top-down” process, rewarding everyone who met a minimum standard while reducing cognitive load.

Their introspections indicate my children treated the task more as a *test* than as a *contest*, giving funds to everyone who met their minimum test standard. I suspect many of the participants in my study treated the task in the same way. Why might they treat the tasks as tests and not contests? The participants were students. Students seem more accustomed to passing tests than to winning contests. So perhaps they treated the tasks according to their experience. Adults are likely to have experienced more contests than have students. It would be worthwhile to conduct a replication with adults to determine if their allocations more closely fit the patterns of contests.

My analyses failed to reveal any significant differences between males and females in the allocation of scholarships and bursaries. This may be because males and females use similar allocation rules or because the measures I used were not sufficiently sensitive. The possibility of the second explanation, however, seems low. The COF and POA indices showed several significant differences, suggesting that they were sensitive. And it is difficult to imagine a more straightforward means of determining the participants' gender than simply asking them, "What is your sex?"

Research conducted in the 1970s showed that gender differences in the allocation of rewards were found mostly in studies asking males and females to allocate rewards to themselves and others in public (Leventhal, 1970; Mikula, 1974). In these studies, men allocated equitably and women equally. However, when participants were asked to make allocations in private, differences were either nonexistent or men allocated equally and women equitably suggesting that, in private, both men and women behave similarly while in public, they behave according to sex-role expectations. In my study, each participant made allocations privately, thus reducing the chances of gender differences.

It would be worthwhile to see if gender differences would be found if participants were asked to allocate scholarship and bursary funds in public/in groups and to themselves and others (or when the allocator is also a receiver).

I also looked at cultural differences in the distribution of scholarships and bursaries. The one dimension of culture I examined was individualism/collectivism which I tried to measure in two ways: (1) The Self-Construal Scale (SCS); and (2) The country of origin of participants' mother. The SCS scale showed no correlation with concentration of funds. However, there were significant differences in concentration indices and individualism/collectivism of the mothers' country of origin for both scholarships and bursaries allocations. Contrary to expectations and previous literature (Fisher & Smith, 2003), collectivists had higher concentration indices than did individualists. The higher concentration scores seemed to be unrelated to mothers' country of origin and suggested a powerful influence of individual differences on allocation rules. It seems worthwhile for future research to examine in more detail which individual differences within a culture account for differences in the concentration of scholarships and bursaries. One individual difference that might account for variation in the concentration of funds is prior success in receiving such funds. Perhaps, for example, those who receive many scholarships would concentrate their scholarship funds more than those who have never received one. My results, however, did not support this conjecture. It would be interesting to examine other individual differences, such as political philosophy, to account for the variability in concentration.

Limitations

In order to increase experimental control, I designed each of the two allocation tasks to include only one piece of information about the applicants: either grade point average or loan amount. Most allocation tasks provide more than one piece of information to allocators about each applicant, and a few participants commented that one piece was not enough. It would be interesting to study what would happen if both GPA and loan amounts were provided to the allocator as applicant information.

It would also be interesting to design a study with groups of students playing the role of allocators, trying to make committee decisions about scholarship and bursary funds. Participants in my study played the role of a single judge making the allocation to eight or 32 applicants. Would group decisions be different than individual decisions?

With 20/20 hindsight, I would have added at least two measures to the experimental tasks. One would be a rating of how deserving of a scholarship or loan the participants thought each applicant to be. If deservingness or merit does link indicators with allocations, then the relations between GPA, loan amounts, deservingness and money allocations would be worthwhile to explore. It would also be worthwhile to ask participants to report the rules they employed to make the allocations, as I did with my children. This could shine more light on how participants select their resource allocation process. Despite its limitations, however, I believe the insights of the study made it worthwhile.

Implications

I believe the results of my research have important conceptual, methodological, and practical implications. The within-subject design allowed me to examine shifts in

allocation processes between the same pairs of ears, giving strong support to the idea that people have a repertoire of processes and invoke different ones according to the occasion. The experimental design included two conditions in which amount of money per applicant was equal; only the number of applicants varied, while scarcity was held constant. This afforded an examination of the effects of cognitive load, and showed that such a load need not lead to in-depth focussing on a few applicants but could instead lead to breadth-only processing. The results imply that people have, or can invent, a repertoire of processes and invoke different ones according to the occasion (see Thorngate, 1975).

My research also has at least one practical implication. The results highlight a profound difference between (1) traditional scholarship and bursary allocations that approximate a Winner(s)-Take-All rule (few receive, many apply) and (2) preferences of prospective applicants (my student participants) that fall between equity and equality rules. In light of this difference, perhaps we should reconsider the way scholarship or bursary funds are allocated to students. Perhaps, by dispersing funds among a larger proportion of students, more of them would be able to pursue their academic interests.

References

- Adams, J.S. (1965). Toward an understanding of inequity. *Journal of Abnormal and Social Psychology*, 67, 422-436.
- Baron, J.(2000). *Thinking and deciding* (3rd edition). New York: Cambridge University Press.
- Cook, K., & Hegtvedt, K. (1983). Distributive justice, equity, and equality. *Annual Review of Sociology*, 9, 217-241.
- Elam, C.L., Stratton T.D., Gilbert, L.A., Stroth, H.I., Vicini, M.B., & Wilson, E.A. (2005). Medical School Performance, Alumni Membership, and Giving: How Do Scholarship Recipients and Non-Recipients Differ? Retrieved February 17, 2008 from Med Educ Online [serial online] 10:8. Web site: <http://www.med-ed-online.org>
- Fischer, R., & Smith, P. (2003). Reward allocation and culture. *Journal of Cross-Cultural Psychology*, 34(3), 251-268.
- Frank, R. H. & Cook, P. J. (1995). *The winner-take-all society*. New-York: Penguin Books.
- Frohlich, N. (2007). A very short history of distributive justice. *Social Justice Research*, 20(2), 250-262.
- Hardin, G. (1968). The tragedy of the commons. *Science*, 162, 1243-1248.
- Homans, G. (1961). *Social behavior: Its elementary forms*. New York: Harcourt, Brace.
- Kahn, A., O'Leary, V., Krulewitz, J. E., & Lamm, H. (1980). Equity and equality: Male and Female means to a just end. *Basic and Applied Social Psychology*, 1(2), 173-197.

- Kahneman, D., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge, New York: Cambridge University Press .
- Lerner, M. J. (1974). The justice motive: "Equity" and "parity" among children. *Journal of Personality and Social Psychology*, 29, 539-550.
- Lerner, M. J. (1977). The justice motive: Some hypotheses as to its origins and forms. *Journal of Personality*, 45, 1-52.
- Leventhal, G. S., & Lane, D. W. (1970). Sex, age, and equity behavior. *Journal of Personality and Social Psychology*, 15, 312-316.
- Lind, A., & Tyler, T. (1988). *The social psychology of procedural justice*. New York: Springer.
- Matania, E. & Yaniv, I. (2007). Resource priority, fairness, and equality-efficiency compromises. *Social Justice Resource*, 20, 497-510.
- Mikula, G. (1974). Nationality, performance, and sex as determinants of reward allocation. *Journal of Personality and Social Psychology*, 29, 435-440.
- Miller, G. A. (1962). *Psychology: The science of mental life*. Harmondsworth, Middlesex, UK: Penguin Books.
- Miller, G. A. (1992). *The science of words*. New York: Freeman.
- Mitchell, G., Tetlock, P.E., Mellers, B.A., Ordonez, L.D. (1993). Judgments of social justice: Compromises between equality and efficiency. *Journal of Personality and Social Psychology*, 65(4), 629-639.
- Paterson, C. C. (1975). Distributive justice within and outside the family. *Journal of Psychology*, 90, 123-127.

- Singelis, T. M. (1994). The measurement of independent and interdependent self-construal. *Personality and Social Psychology Bulletin*, 20, 580-591.
- Spence, J.T., & Helmreich, R.L. (1978). Masculinity and femininity: Their psychological dimensions, correlates, and antecedents. Austin, TX: University of Texas Press.
- Stake, J.E. (1983). Factors in reward distribution: Allocator motive, gender, and protestant ethic. *Journal of Personality and Social Psychology*, 44, 410-418.
- Steiner, I. D. (1972). *Group processes and productivity*. New York: Academic Press.
- Skitka, L. J., & Tetlock, P. E. (1992). Allocating scarce resources: A contingency model of distributive justice. *Journal of Experimental Social Psychology*, 28, 491-522.
- Thorngate, W. (1975). Process invariance: Another red herring. *Personality and Social Psychology Bulletin*, 1, 485-488.
- Thorngate, W., & Maki, J. (1976). *Decision heuristics and the choice of political candidates* (Tech. Rep. 74-4). Social Psychology Labs, University of Alberta, Edmonton, Alberta.
- Thorngate, W., Dawes, R. M. & Foddy, M. (2009). *Judging merit*: Psychology Press.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 4, 207-232.

Appendix A: Self-Construal Scale

Instructions

This is a questionnaire that measures a variety of feelings and behaviors in various situations. Listed below are a number of statements. Read each one as if it referred to you. Beside each statement write the number that best matches your agreement or disagreement. Please respond to every statement. Thank you.

1=STRONGLY DISAGREE

4=DON'T AGREE OR

5=AGREE SOMEWHAT

2=DISAGREE

DISAGREE

6=AGREE

3=SOMEWHAT DISAGREE

7=STRONGLY AGREE

- ___ 1. I enjoy being unique and different from others in many respects.
- ___ 2. I can talk openly with a person who I meet for the first time, even when this person is much older than I am.
- ___ 3. Even when I strongly disagree with group members, I avoid an argument.
- ___ 4. I have respect for the authority figures with whom I interact.
- ___ 5. I do my own thing, regardless of what others think.
- ___ 6. I respect people who are modest about themselves.
- ___ 7. I feel it is important for me to act as an independent person.
- ___ 8. I will sacrifice my self interest for the benefit of the group I am in.
- ___ 9. I'd rather say "No" directly, than risk being misunderstood.
- ___ 10. Having a lively imagination is important to me.
- ___ 11. I should take into consideration my parents' advice when making education/career plans.
- ___ 12. I feel my fate is intertwined with the fate of those around me.
- ___ 13. I prefer to be direct and forthright when dealing with people I've just met.
- ___ 14. I feel good when I cooperate with others.
- ___ 15. I am comfortable with being singled out for praise or rewards.
- ___ 16. If my brother or sister fails, I feel responsible.
- ___ 17. I often have the feeling that my relationships with others are more important than my own accomplishments.
- ___ 18. Speaking up during a class (or a meeting) is not a problem for me.
- ___ 19. I would offer my seat in a bus to my professor (or my boss).
- ___ 20. I act the same way no matter who I am with.
- ___ 21. My happiness depends on the happiness of those around me.
- ___ 22. I value being in good health above everything.
- ___ 23. I will stay in a group if they need me, even when I am not happy with the group.
- ___ 24. I try to do what is best for me, regardless of how that might affect others.
- ___ 25. Being able to take care of myself is a primary concern for me.
- ___ 26. It is important to me to respect decisions made by the group.
- ___ 27. My personal identity, independent of others, is very important to me.
- ___ 28. It is important for me to maintain harmony within my group.
- ___ 29. I act the same way at home that I do at school (or work).
- ___ 30. I usually go along with what others want to do, even when I would rather do something different.

Appendix B: Personal Attributes Questionnaire

The following questions ask about what kind of person you think you are. Each consists of a PAIR of characteristics, with the numbers 1 to 5 in between. For example,

Not at all artistic 1 2 3 4 5 Very artistic

Each pair describes contradictory characteristics - that is, you cannot be both at the same time, such as not at all artistic and very artistic. Please circle the number that best describes where YOU fall on each scale, with lower numbers (1 or 2) indicating that you have more of the characteristic on the left and higher numbers (4 or 5) indicating that you have more of the characteristic on the right. For example, if you think you have no artistic ability, you would circle 1. If you think that have pretty good artistic ability, you might circle 4. If you think you have average artistic ability, you would circle 3.

- | | | | |
|-----|---|---------------------------|--|
| 1. | Not at all independent | 1.....2.....3.....4.....5 | Very independent |
| 2. | Not at all emotional | 1.....2.....3.....4.....5 | Very emotional |
| 3. | Very passive | 1.....2.....3.....4.....5 | Very active |
| 4. | Not at all able to devote self completely to others | 1.....2.....3.....4.....5 | Able to devote self completely to others |
| 5. | Very rough | 1.....2.....3.....4.....5 | Very gentle |
| 6. | Not at all helpful to others | 1.....2.....3.....4.....5 | Very helpful to others |
| 7. | Not at all competitive | 1.....2.....3.....4.....5 | Very competitive |
| 8. | Not at all kind | 1.....2.....3.....4.....5 | Very kind |
| 9. | Not at all aware of feelings of others | 1.....2.....3.....4.....5 | Very aware of feelings of others |
| 10. | Has difficulty making decisions | 1.....2.....3.....4.....5 | Can make decisions easily |
| 11. | Gives up very easily | 1.....2.....3.....4.....5 | Never gives up easily |
| 12. | Not at all self-confident | 1.....2.....3.....4.....5 | Very self-confident |
| 13. | Feels very inferior | 1.....2.....3.....4.....5 | Feels very superior |
| 14. | Not at all understanding of others | 1.....2.....3.....4.....5 | Very understanding of others |
| 15. | Very cold in relations with others | 1.....2.....3.....4.....5 | Very warm in relations with others |
| 16. | Goes to pieces under pressure | 1.....2.....3.....4.....5 | Stands up well under pressure |

Appendix C: Background Questions

1. How old are you? _____ years
2. Are you male or female? ____ Male ____ Female
3. In what country was your mother born? _____

Scholarship: A grant of money awarded for academic achievement

4. How many scholarships have you applied for? _____
5. How many scholarships have you received? _____

Bursary: A grant of money awarded for financial need

6. How many bursaries have you applied for? _____
7. How many bursaries have you received? _____

Appendix D: Scholarship Allocation

Instructions for Scholarship Judgments

Suppose Carleton University has asked you to judge a set of 32 scholarship applications. Scholarships are given according to academic achievement. The university shows you the Grade Point Average (GPA, in percent) of each applicant, an indicator of academic achievement. Your task is to distribute \$10,000 in scholarship funds according to academic achievement.

On the next page you will see a list of the 32 applicants and their GPAs. You will also see a slider you can use to allocate the \$10,000. Please allocate the money in the way you believe is most fair.

You can select each applicant by clicking on her/his name. Slide the button of the slider left and right to change the money you allocate for the applicant you have selected. If you have any questions before beginning, please ask the experimenter now.

next

Click on Applicant name to select an applicant.

Drag the button left or right to adjust scholarship amount.

Applicant	Grade Average	Scholarship?
Fatima al Monseh	95	2800
Shawn Babcock	94	2000
Linda Peters	93	1000
Mary Dodson	93	1000
Mona Cerrado	92	600
Alice Cramer	91	0
Elizabeth Chow	90	0
Ivan Borazonki	90	0
Eva Polanska	89	0
Thomas Valcovic	89	0
Lisa Subraharian	89	0
Ali Fazeli	89	0
Genvieve Adamson	89	0
Nathan Arbor	88	0
Monique Valet	88	0
Sweetie Dubala	88	0
Angel Northcott	87	0
Tamara Lucerne	87	0
Carol Quan Nok	86	0
Michael deCharme	86	0
Carl Miller	85	0
Sean Thompson	83	0
William Korkomunga	83	0
Frank Li Xiao	83	0
Mariam Bagherian	82	0
Mohammad al Fakowi	82	0
James Forge	81	0
Darryl Williams	81	0
Tiffini Chandler	81	0
Peter Willisten	79	0
Larry Xi Ping	78	0
Nelson Mumondonga	77	0



next

Appendix E: Bursary Allocation to be included

Instructions for Bursary Judgments

Suppose Carleton University has asked you to judge a set of 32 bursary applications. Bursaries are given according to financial need. The university shows you the amount of student loans held by each applicant, an indicator of financial need. Your task is to distribute \$10,000 in bursary funds according to financial need.

On the next page you will see a list of the 32 applicants and their student loans. You will also see a slider you can use to allocate the \$10,000. Please allocate the money in the way you believe is most fair.

You can select each applicant by clicking on her/his name. Slide the button of the slider left and right to change the money you allocate for the applicant you have selected. If you have any questions before beginning, please ask the experimenter now.

next

Click on Applicant name to select an applicant.

Drag the button left or right to adjust bursary amount.

Applicant	Total Loans	Bursary?
Luisa Rossi	17126	1500
Jacques Dupuis	16838	1500
Lorraine Gardner	15991	1000
Richard Read	15917	1000
Amedeo Custodio	15674	1000
Emily Parker	14910	800
Maria Perez	14851	800
Lisa Russell	14479	700
Sharnett Okpo	14407	700
Pierre Couture	14327	400
Jose Francisco	14227	200
Roger Clery	14094	200
Sara Olson	14002	0
Marie-Eve Seguen	13820	0
Paramjit Bhullar	13730	0
Steve Neumann	13521	0
Keith Baker	13221	0
Chris Ray	13073	0
Nicholas Mintenko	13008	0
Rachelle Dorion	12677	0
Jonathan Blouin	12528	0
Marion Chevrier	11676	0
Michel Lambert	11515	0
Amy Carter	11032	0
Vincent Garneau	10943	0
Alice Wu Ling	10927	0
Dale Howard	10351	0
Amelie La Roche	10300	0
Sylvie Carriere	10148	0
Diane Montgrain	9254	0
Jennifer Campbell	8873	0
Armand Lavigne	8141	0



next

Appendix F: Recruiting Announcement on Experiment Management System (SONA)

Study Name: Achievement, Need, and the Distribution of Scarce Resources

Description: : With this study we want to understand how people allocate scholarship and bursary funds to hypothetical meritorious and needy applicants.

Duration: 45 minutes

Location: 2111 HCI

Percentage/pay: 1 credit

Researcher: Claudia Rocca, crocca@connect.carleton.ca

Supervisor: Dr. Warren Thorngate, A404 Loeb Building

Participant sign-up deadline: 24 hours before the study

Participant cancellation deadline: 12 hours before the study

Appendix G: Informed Consent

Title of the study: Achievement, Need, and the Distribution of Scarce Resources.

Invitation to take part: We are seeking university students willing to take part in a study that examines how people would allocate scholarship and bursary money if they were given the opportunity to do as they wish.

What is the purpose of this study: the purpose of this study is to understand how people allocate scholarship and bursary funds to hypothetical meritorious and needy applicants. We hope the result will give insight into more general ideas of procedural and distributive fairness and justice.

What will participation involve: If you agree to participate in this study, you will be asked to fill in two questionnaires. The first questionnaire will ask you questions related to which person you think you are and the second one will measure your feelings and behaviours in various situations. Once you have completed the questionnaires, you will be asked to play the role of a judge for allocating scholarship and bursary funds to first year university students' applicants.

Duration of the experiment: Approximately 45 minutes.

What risks and benefits are associated with participating: There are no risks or discomforts associated with taking part in this study. You are free to change your mind about participating in this study at any time.

Is this confidential and who will know what I say? Any information you will give will remain strictly confidential and will only be seen by me (the experimenter) and my research supervisor Professor Thorngate. The information you will give to me will be used for research purpose only; it will be identified with a serial number and stored at Carleton University. Your name will not be required for the study.

Is my participation voluntary? Your participation in this study is entirely voluntary. You are free to withdraw from the study at any time, refuse to participate and refuse to answer any of the questions without penalty.

What if I have more questions? If you have further questions about the procedure and purpose of this study or your involvement in the study, you can email the researcher, Claudia Rocca, at crocca@connect.carleton.ca or call (613) 520-2600, extension 4578 or her supervisor, Dr. Warren Thorngate at (613) 520-2600, ext. 2706. If you have any questions about your rights as a participant in this study or if you would like to discuss your participation in the study, you can contact the Chair of the Research Ethics Board Dr. Monique Senechal, at Carleton University, at (613) 520-2600, ext. 1155 or by email monique_senechal@carleton.ca. For any other concerns pertaining to this study, please contact Dr. Janet Mantler, Chair of the Department of Psychology, at (613) at 613 520-2600 ext. 2648.

Appendix H: Debriefing

Thank you for participating in this study

What are we trying to learn in this research? We are trying to understand how people would allocate scholarship or bursary money to meritorious or needy applicants in situations of abundance versus scarcity of resource and with few and many applicants.

Why is this important to scientists or the general public?

The purpose of this study is to examine some of the psychological factors that likely contribute to judges' selection of allocation rules. Each day, hundreds of thousands of competitions are held in every society to determine who will get what shares of limited resources. The resources include everything from audiences to jobs, parking spaces to presidencies, trophies to transplants, research grants to recording contracts. Most of these competitions have rules governing how winners and losers shall be chosen, and how the resources shall be distributed among them. Debates about these rules form the bulk of a large literature on procedural and distributive justice (see Homans, 1961; Frohlich, 2007; Lind & Tyler, 1988).

Thus, this research will have important implications for the general public and scientists who wish to have a better understanding of procedural and distributive fairness.

What are the hypotheses and prediction? In the present research I intend to examine how task, scarcity, number of applicants and allocators' sex affect judges' choice of allocation rule.

I am expecting that when scholarship and bursary money is abundant, judges will distribute the scholarship money in proportion of the applicant's merit (equity rule) and the bursary money evenly among applicants (equality rule). However, when money is scarce, I predict that judges will concentrate the scholarship money to the most meritorious applicant and the bursary money to the neediest applicant.

I am also expecting to find cultural and gender differences in the way resource will be distributed among applicants.

Where can I learn more? If you want to learn more you can read the following journal articles: Frohlich, N. (2007). A very short history of distributive justice. *Social Justice Research*, 20 (2), 250-262. Cook, K., & Hegtvedt, K. (1983), or Distributive justice, equity, and equality. *Annual Review of Sociology*, 9, 217-241.

What if I have questions later? For any questions or concerns regarding the research, please contact either the Principal Investigator (Claudia Rocca at crocca@connect.carleton.ca, or call (613) 520-2600, extension 4578 or you can contact the Faculty Sponsor (Dr. Warren Thorngate, 613 526-2600 ext. 2706, warren_thorngate@carleton.ca). For ethical concerns, please contact Dr. Monique Senechal, Chair of the Carleton University Ethics Committee for Psychology Research, at (613) 520-2600 ext. 1155. For any other concerns pertaining to this study, please contact Dr. Janet Mantler, Chair of the Department of Psychology, at (613) at 613 520-2600 ext. 2648.