Correlation Neglect in Student-to-School Matching

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A growing body of evidence suggests that many people struggle with decision-making in the presence of correlation. In typical examples of this problem, decision-makers are presented with multiple signals that are each influenced both by independent components and information from a common source. The process by which signals are generated induces correlation, and optimal decision-making requires taking it into account. In practice, however, experiments like those of Enke and Zimmermann [1] demonstrate that many decision-makers neglect to do so, effectively acting as if these correlated signals are independent.

We study the prevalence and consequences of these failures of reasoning in a decision of considerable importance: the application strategies of students applying to schools. Many application processes inherently require students to make forecasts of events determined by common underlying inputs, resulting in correlation structures like those described above. For example, students commonly must whittle a large number of schools down to a smaller set that are applied to or ranked, introducing an incentive to avoid listing two programs with highly correlated admissions decisions. In such environments, a student harboring correlation neglect faces a challenging decision.

To illustrate these difficulties, consider a simple example. Imagine there are three programs at which you could potentially match, offering payoffs of 3, 2, and 1. Call these programs the best, middle, and worst programs, respectively. These programs will all rank you based on a common, currently-unknown, priority score; assume it will be a random integer drawn from a uniform distribution ranging from 0 to 99. The best program will admit you if your score is at least 50. The middle program will admit you if your score is at least 45. The worst program will admit you with any score. If you could only apply to two of these programs, to which two would you apply?

When considering this problem, it may be tempting to apply to the two programs with the highest payouts—we refer to this as the *aggressive application strategy*. However, doing so is costly in expectation. Because these programs rely on the same score and have near-identical thresholds, the probability of being accepted by the middle program *conditional on being rejected by the best program* is quite low (10%), and insufficient to motivate a risk-neutral decision-maker from taking

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the sure payoff offered by applying to the worst school. Expected payout is maximized by applying to the best and the worst programs—we refer to this as the *diversified application strategy*.

Consider next a slightly modified example. Imagine you are considering the same three programs, but now these programs rank you based on program-specific, statistically independent priority scores. Again, these evaluations are drawn from a uniform distribution ranging from 0 to 99. The best program's score threshold remains at 50, and the worst program continues to admit anyone. However, the middle program's acceptance threshold is changed to 90. In this situation, to which two schools would you apply?

As above, applying to the best and the worst programs remains the expected-value-maximizing strategy. Moreover, the consequences of pursuing either the diversified or aggressive application strategies are exactly the same as in the first example. The diversified application strategy grants a 50% chance of enrollment at the best program and a 50% chance of enrollment at the worst program. The aggressive application strategy grants a 50% chance of enrollment at the best program and, conditional on rejection there, a 10% chance of enrollment at the middle program. If one is restricted to these two strategies, choices across these scenarios should be identical.

In this paper, we demonstrate that students' application strategies across these scenarios are quite different. To study this issue systematically, we ran a laboratory experiment among 165 students of Penn State University. Subjects faced pairs of incentivized application scenarios much like the example above. When admissions are correlated, we find that a substantial fraction of students apply to the two most selective programs—i.e., they apply aggressively. By contrast, when admissions are determined independently, subjects intelligently pursue the diversified application strategy at a much higher rate. Interpreted in the context of our example: subjects act as if a 10% conditional probability of acceptance (the relevant probability for decision-making in the first example) is much more appealing than a transparent 10% unconditional probability of acceptance (the relevant probability for decision-making in the second example).

These simple examples illustrate something we believe to be a pervasive feature of school choice. In many environments, students can only apply to a subset of the schools that they see as attractive. In such situations, correlation in evaluations at different programs may be neglected or underweighted, leading students to fail to apply the appropriate contingent reasoning when deciding whether to apply to programs of similar selectivity.

Our findings have several direct implications for market designers. First, they provide a new rationale for market designers to avoid limiting the length of application lists. Second, in the common situation where limiting the length of application lists is necessary, they suggest an important role for interventions that help students in assessing the probabilities of assignment that arise from their application strategy. Third, they suggest that the (unmodeled) presence of correlation neglect can lead to incorrect inference regarding students' risk tolerance and utility assessments—a finding of broad relevance for the structural estimation of school-choice models.

As the detailed examination of behavior in matching markets continues, we believe further attention to imperfectly rational forces like correlation neglect will benefit both the explanatory and predictive power of our models.

The full version of this paper is available here: https://www.nber.org/papers/w26734

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