Economic Rationality under Limited Attention: The Effect of Sequential Elimination

Rui Guan*

June, 2024

Abstract

Evidence suggests that limited attention to all available options often leads individuals to deviate from preference maximization. We propose a framework incorporating choice procedures where individuals consider at least two available options. We show that choices made under *sequential elimination* (whereby options are eliminated one by one until only one survives) always maximize preferences, whereas choices made directly from menus do not. Using a controlled experiment, we provide causal evidence that sequential elimination significantly improves choice consistency with preference maximization among subjects with low cognitive ability. Additionally, we examine individual preferences for sequential elimination and their implications.

JEL codes: C90, D81, D91, G11, I31.

Keywords: economic rationality, revealed preference, choice procedures, sequential elimination, experiment.

*School of Economics, University of Kent. E-mail: r.guan@kent.ac.uk. I thank Jose Apesteguia, Francesco Cerigioni, Fabrizio Germano, Paul J. Healy, Katharina A. Janezic, Rumen Kostadinov, Adam Lee, Paola Manzini, Marco Mariotti, Rosemarie Nagel, Daniel Navarro, Thomas Neuber, John Rehbeck, Mikhail Spektor, and Zaki Wahhaj, as well as conference and seminar participants at the Asian Meeting of the Econometric Society (2022), the Society for the Advancement of Economic Theory Conference (2022), and Universitat Pompeu Fabra for their comments and suggestions. This work has benefited from the generosity of Hyuncheol Bryant Kim, Syngjoo Choi, Booyuel Kim, Cristian Pop-Eleches, Leandro S. Carvalho, Stephan Meier, and Stephanie W. Wang in providing their experimental materials, as well as Yoram Halevy, Dotan Persitz, Lanny Zrill, and Oriel Nofekh for their support of code packages. The study is registered as AEARCTR-0005220 and received IRB approval from Universitat Pompeu Fabra. Financial support from the Spanish Ministry of Science and Innovation (PGC2018-098949-B-I00) is gratefully acknowledged. All errors are mine.

1 Introduction

The standard principle of economic rationality requires individual behavior to be consistent with preference maximization. Extensive research, however, suggests that *limited attention*—which entails individuals considering only a limited set of options—often results in choices inconsistent with preference maximization (e.g., Masatlioglu, Nakajima, and Ozbay, 2012; Dean, Özgür Kıbrıs, and Masatlioglu, 2017; Lleras et al., 2017). This issue is prevalent in markets with an overwhelming number of options—such as bank loans (Honka, Hortaçsu, and Vitorino, 2017), health services (Gaynor, Propper, and Seiler, 2016), and insurance plans (Abaluck and Adams-Prassl, 2021)—posing a substantial welfare challenge to economists and policymakers. Despite this wealth of research, a significant gap persists in the literature concerning the improvement of economic rationality in decision-making.

We present the first study to demonstrate how a simple *choice procedure* can systematically ameliorate choice inconsistency with preference maximization under limited attention. Building on the seminal insights of Simon (1955, 1976) regarding the foundational role of choice procedures in decision-making, we introduce a tractable framework to examine the impacts of choice procedures on the consistency of choices made by a decision maker (DM) with standard preferences and limited attention.[1]

Our framework enables a rigorous comparison of choice consistency across two notable but distinct choice procedures. The first is the *direct procedure*, in which the DM chooses directly from menus. In this procedure, limited attention may cause inconsistencies due to the DM overlooking the best options on menus. This leads us to examine *sequential elimination*, where the DM eliminates options one by one until only one survives. It has been widely studied in marketing, psychology—and more recently,—economics (e.g., Manzini and Mariotti, 2007; Masatlioglu and Nakajima, 2007).

This investigation is particularly motivated by empirical evidence showing that both *sequential* (Besedeš et al., 2015) and *elimination-based* (e.g., Sokolova and Krishna, 2016) procedures mitigate choice overload. While sequential elimination appears to integrate the benefits of the two approaches, a thorough analysis is still required to probe its normative role and underlying mechanism in economic rationality. Thus, we contribute to the literature by providing a choice-theoretic framework of sequential elimination that yields testable implications.

[1] In this paper, standard preferences are defined as complete, transitive, and monotone. Formal details are provided in Section 2.

We identify a key property, referred to as the *minimum attention* property, to establish the DM's choice consistency with preference maximization under sequential elimination. Drawing upon converging evidence from economics and the cognitive sciences, the property indicates that the DM considers at least two options when faced with a menu of multiple options.[2] An intuitive explanation is that in every elimination round, one of the best options in a menu survives—either by being overlooked or by beating the other considered options. Consequently, sequential elimination decomposes a potentially intractable preference maximization problem into a sequence of streamlined elimination problems. Based on these theoretical results, we hypothesize that sequential elimination, as compared with the direct procedure, leads to a higher level of consistency in the choices of individuals with limited attention.

To test this hypothesis, we conduct an experiment guided by the framework. The experiment assesses choice consistency through twenty decision problems involving risk, adapted from Kim et al. (2018). Each problem comprises eleven distinct, randomly ordered options, each representing a lottery rewarding one of two monetary amounts with equal probability. Given the simplicity of each option, the primary challenge in this setup lies in considering all available options across all decision problems. Thus, the experiment closely emulates decision-making in real-world scenarios marked by limited attention, allowing for a cautious interpretation of treatment differences, particularly concerning this root cause.

Given our context of finite choice sets, we test economic rationality using a necessary and sufficient criterion adapted from Nishimura, Ok, and Quah (2017), who extend the results of Afriat (1967) to characterize choices consistent with preference maximization in general settings. We refer to this criterion as *GARP*, as it closely resembles the standard Generalized Axiom of Revealed Preference (Afriat, 1967; Varian, 1982). In decision-making under risk, choices satisfying GARP can be rationalized by preferences that allow for violations of first-order stochastic dominance (FSD), which typically indicate the quality of decisions (e.g., Choi et al., 2014; Polisson, Quah, and Renou, 2020).[3] To address this, we employ a more stringent test of choice consistency, which respects FSD, referred to as *FSD-GARP*. Our primary measures of economic rationality include two binary metrics indicating whether individual choices satisfy the GARP and FSD-GARP criteria.

In the main experiment, subjects are randomly assigned to either the *Direct Procedure*

[2] See Section 1.1 for a review of the evidence.

[3] Violations of FSD occur when individuals prefer an option over another one offering better outcomes without any additional risk, but this does not necessarily imply deviations from choice consistency.

or *Sequential Elimination* treatments, which implement the corresponding choice procedures with meticulously controlled instructions and user interfaces.[4] Considering that limited attention may be more prevalent among individuals with lower cognitive ability, we assess cognitive ability using IQ scores obtained from the International Cognitive Ability Resource (ICAR) test (Condon and Revelle, 2014). This assessment enables a rigorous evaluation of our hypothesis by focusing on *low-IQ* subjects (i.e., those with below-or-equal-to-median IQ scores), who effectively represent individuals with limited attention. To obtain an accurate estimation of the effect of sequential elimination, we control for additional cognitive functions (selective attention and working memory capacity), demographics, individual attitudes toward inconsistency, and decision time.

Our central experimental results indicate that Sequential Elimination significantly increases the probability of low-IQ subjects achieving choice consistency by 23.3 percentage points as compared with the Direct Procedure. This improvement exceeds 53.8% of their estimated consistency probability under the Direct Procedure. Similarly, Sequential Elimination leads to a substantial rise of 21.0 percentage points in the probability of their choices satisfying FSD-GARP, which amounts to 75% of their estimated probability under the Direct Procedure. The effect of Sequential Elimination among low-IQ subjects remains marked across other measures of economic rationality, including the number of GARP and FSD-GARP violations, as well as variants of the Houtman–Maks index (Houtman and Maks, 1985) computed based on GARP and FSD-GARP. Collectively, the results offer causal evidence in support of our hypothesis.

Additional results align with our framework. Importantly, subjects with IQ scores in the lowest tercile and quartile demonstrate significant improvements in choice consistency under Sequential Elimination, with magnitudes surpassing those identified among low-IQ subjects. Meanwhile, Sequential Elimination enhances choice consistency respecting FSD among subjects with IQ scores in the middle tercile and quartiles, suggesting a complementary effect of sequential elimination with cognitive ability in addressing deviations from economic rationality. These findings reinforce the evidence for the role of sequential elimination in bolstering economic rationality.

Understanding whether sequential elimination aligns with individual preferences is crucial for its real-world applications. To this end, we implement a third treatment, referred to

[4]See Section 3.2 for details of the experimental treatments. Throughout this paper, where initially capitalized, the terms Direct Procedure and Sequential Elimination refer to the respective experimental treatments; otherwise, they indicate their respective general meanings.

as *Procedure Preference*, where subjects choose between the Direct Procedure and Sequential Elimination, subsequently making decisions using their preferred procedures. Our analysis reveals a pronounced preference for Sequential Elimination among subjects with lower cognitive abilities. Specifically, 82.1% of low-IQ subjects prefer this procedure, while their high-IQ counterparts show indifference between the two procedures.

The analysis also indicates negligible differences in economic rationality between subjects selecting Sequential Elimination under the Procedure Preference treatment and those directly assigned to it. Furthermore, the Procedure Preference treatment improves economic rationality as compared with the Direct Procedure, with an effect approaching that attributable to Sequential Elimination in both magnitude and statistical significance. These consistent findings suggest that a non-coercive implementation, which merely offers sequential elimination as an optional procedure, can achieve meaningful improvements for cognitively disadvantaged individuals who preferentially adopt it.

We further investigate the relationship between decision time and economic rationality under limited attention. Our data reflect an overall negative correlation between decision time and both GARP violations and the HMI. This aligns with the general findings of the cognitive sciences regarding the trade-off between decision time and errors (see, e.g., Heitz, 2014, for a review). However, our additional analysis incorporating the impact of choice procedures only confirms an effect in reducing GARP violations only among low-IQ subjects under Sequential Elimination. Our interpretation is that the relationship between decision time and economic rationality may hinge on choice procedures.

Recent studies show that compliance with relatively straightforward normative axioms (such as FSD) can be enhanced by *choice revision*, an alternative procedure that allows individuals to revise their choices (e.g., Benjamin, Fontana, and Kimball, 2020; Nielsen and Rehbeck, 2022; Breig and Feldman, 2024). Yet, the robustness of this effect on economic rationality remains to be established in settings where limited attention looms. We incorporate a choice revision mechanism into our experiment, revealing its effect on enhancing economic rationality only when limited attention is mitigated—specifically, in the presence of high cognitive ability or sequential elimination. This serves as corroborative evidence for the nontrivial role of sequential elimination in addressing limited attention.

Our findings offer practical implications for policymakers. First and foremost, sequential elimination is distinguished by its intuitive nature and relatively low implementation cost.

These attributes make it economically viable, especially for individuals with socioeconomic disadvantages, in a wide range of consequential decision-making scenarios—such as bank loans, health insurance, and pension plans—where limited attention is often detrimental to welfare. The efficacy of this procedure in various choice domains is justifiable, to a conceivable extent, by the minimum attention property. Additionally, the procedure features a high degree of implementation flexibility. For example, policymakers could offer it as a public good and encourage its voluntary adoption by individuals. Finally, the paper illuminates the potential of implementing choice procedures in harmony with individual preferences, a crucial consideration for effective public policy.

1.1 Related Literature

This paper extends the body of work on limited attention models, which typically postulate that individuals directly choose from a limited set of alternatives on a menu, known as the *consideration set* (e.g., Masatlioglu, Nakajima, and Ozbay, 2012; Dean, Özgür Kıbrıs, and Masatlioglu, 2017; Lleras et al., 2017). For example, Eliaz and Spiegler (2011) study the implications of consideration sets within market competition. Recent models by Manzini and Mariotti (2014), Caplin, Dean, and Leahy (2018), and Cattaneo et al. (2020) propose that consideration sets arise stochastically. More closely related to our work, Dardanoni et al. (2020) attribute variation in consideration set sizes to cognitive heterogeneity.

Building on these advancements, we introduce the minimum attention property, which finds robust support in diverse studies. Eye-tracking studies, for instance, consistently show that subjects consider at least two options (Krajbich and Rangel, 2011; Reutskaja et al., 2011). Additionally, field data corroborate the formation of consideration sets that commonly include two or more options (Honka, Hortaçsu, and Vitorino, 2017; Barseghyan, Molinari, and Thirkettle, 2021). Cognitive science findings further confirm that adult attention spans extend beyond two objects, reinforcing the minimum attention property (see, e.g., Cowan, 2001, for reviews). We contribute to the literature by leveraging this property to formally explore the potential for shaping economic rationality through choice procedures.

The concept of sequential elimination, originating from marketing and psychology, has been proposed as an intuitive approach to simplify decision-making by focusing on criteria such as distinctive features of alternatives (Tversky, 1972) or environmental cues (Gigerenzer and Todd, 1999). More recently, this approach has gained traction within the field of economics. Masatlioglu and Nakajima (2007) propose a choice model in which individuals select all the remaining options after eliminating those dominated by another alternative on a menu, according to certain comparison criteria. Their model accounts for choice inconsistencies via the menu-dependence of comparable alternatives and eliminations. Our framework diverges by its motivation to improve economic rationality and its incorporation of a descriptively appealing structure of limited attention.

Alternative choice-theoretical models postulate that individuals may eliminate alternatives sequentially based on multiple acyclic relations (Manzini and Mariotti, 2007), a checklist of desirable properties (Mandler, Manzini, and Mariotti, 2012), or a specific order of binary comparisons (Apesteguia and Ballester, 2013). These models generally suggest that individuals may not inherently maximize a standard preference relation. Conversely, our paper reevaluates the fundamental economic assumption that individuals seek to maximize preferences, exploring how the hindrance of this process by cognitive constraints—especially limited attention—could be mitigated by choice procedures.

Accumulating experimental evidence suggests that sequential elimination may improve individual decision-making. Besedeš et al. (2015) demonstrate the efficacy of sequential procedures in mitigating choice overload. They investigate a *sequential tournament* procedure where subjects engage in multiple rounds to choose from a menu of sixteen options: the first four rounds feature small menus, each comprising four options from the menu, followed by a final round consisting of the four options previously chosen. Their findings indicate a greater likelihood of subjects choosing the optimal options—those with the highest probabilities of yielding a prize—in this sequential procedure than when choosing from the entire menu in a single round. In addition, research in marketing and psychology suggests that individuals consider more options in judgment tasks when employing elimination strategies than when making direct or inclusion-based judgments (Yaniv and Schul, 1997, 2000; Sokolova and Krishna, 2016).

This paper relates to the literature on the determinants of economic rationality. Expanding experimental works suggest a positive correlation between choice consistency and factors such as education (Harbaugh, Krause, and Berry, 2001), market experience (List and Millimet, 2008), and cognitive ability (Burks et al., 2009). The analyses by Echenique, Lee, and Shum (2011) and Choi et al. (2014) of extensive datasets from the U.S. and the Netherlands, respectively, reveal lower levels of economic rationality among socioeconomically disadvantaged and older households. Fisman et al. (2015) find that elite law students are more consistent in the context of altruistic choices than those drawn from a diverse sample of U.S. adults. Leveraging scanner data from Denver, Dean and Martin (2016) uncover that households of retirement age exhibit higher levels of economic rationality than their younger counterparts. Extending this line of inquiry, Echenique, Imai, and Saito (2023) furnish further evidence that diminished levels of economic rationality are associated with lower cognitive abilities, older age, and unemployment. Furthermore, Cappelen et al. (2023) highlight a gap in economic rationality between developed and developing economies.

Despite its central importance, the improvement of economic rationality has been the focus of relatively few studies. Notably, Kim et al. (2018) conduct a field experiment providing an educational program for Malawian secondary school girls. They provide causal evidence that education improves economic rationality, in part by enhancing cognitive ability. Banks, Carvalho, and Perez-Arce (2019), however, find no significant impact of education on economic rationality among people affected by a compulsory schooling policy in England. Halevy and Mayraz (2022) experimentally identify a strong preference for rule-based investment choices, particularly those involving simple rules, over case-by-case decision-making. Our research complements the existing literature by proposing a tractable choice-theoretical framework that yields testable implications in experiments, thereby offering causal insights into improving economic rationality through choice procedures.

The remainder of the paper is organized as follows. Section 2 introduces the framework from which we derive our hypothesis. Section 3 details the experimental design. Section 4 presents the experimental results. Section 5 discusses the further implications of the findings, and Section 6 offers concluding remarks.

2 Framework

Let X be a nonempty finite subset of $\mathbb{R}^n_+$, consisting of *options* denoted by x, y, and z, each representing a bundle of n goods. Let $\mathscr{X}$ be a nonempty set of nonempty subsets of X; this is the set of *menus* with typical elements A, B. Formally, a *choice function* c assigns to every $A \in \mathscr{X}$ a unique element $c(A)$ in A, indicating that the DM chooses the option $c(A)$ from the menu A. Let $\succsim$ be a complete, transitive, and monotone *preference relation* on X.[5]

[5]For two vectors $x, y \in \mathbb{R}^n_+$, we write $x \geq y$ if $x_k \geq y_k$ for all $k = 1, \ldots, n$; and $x \gg y$ if $x_k > y_k$ for all $k = 1, \ldots, n$. A preference relation $\succsim$ is monotone if $x \geq y$ implies $x \succsim y$ and $x \gg y$ implies $x \succsim y$ but not $y \succsim x$. This is also

We consider that the DM has limited attention. Specifically, when faced with a menu A, the DM pays attention to a limited set of options on the menu, $\gamma(A)$, known as the consideration set. The DM's consideration set formation satisfies the minimum attention property, i.e., he pays attention to at least two options when A comprises multiple options. Formally, a *consideration set mapping* γ assigns to every $A \in \mathscr{X}$ a subset of A such that $|\gamma(A)| \geq \min\{|A|, 2\}$. A consideration set mapping is said to be a *full consideration* if for all $A \in \mathscr{X}$, $\gamma(A) = A$.

2.1 Direct Procedure

In the direct procedure, the DM chooses an option that is preferred to all the others in his consideration set within a menu. The following definition is adapted from Masatlioglu, Nakajima, and Ozbay (2012).

Definition 1. A choice function c is a *direct choice* if there exist a preference relation $\succeq$ and a consideration set mapping γ such that for every $A \in \mathscr{X}$, $c(A)$ is the $\succeq$-best option in $\gamma(A)$. Further, c is a *direct choice with full consideration* if γ is a full consideration.

To assess economic rationality, we employ a testable criterion adapted from Nishimura, Ok, and Quah (2017). They develop an intuitive and empirically feasible test of choice consistency with preference maximization, extending Afriat (1967)'s results beyond the classical consumption choice setting.[6]

We now introduce our adaptation to this setting. For any $x, y \in X$, we denote that xR^D (R^S, respectively) y if there exist some $A, B \in \mathscr{X}$ and $z \in A$ such that $c(A) = x$, $c(B) = y$, and $z \geq$ ($\gg$, respectively) y. We denote xRy if there exists a sequence $x, z_1, z_2 \ldots, z_k, y$ such that $xR^D z_1$, $z_1 R^D z_2, \ldots, z_k R^D y$; that is, R is the transitive closure of R^D. For convenience, we refer to this criterion as GARP, as it closely resembles the Generalized Axiom of Revealed Preference.[7] Formally,

Definition 2 (GARP)**.** A choice function c is said to satisfy GARP if, for any $x, y \in X$, xRy implies that $yR^S x$ does not hold.

Unless the DM considers every available option under the direct procedure, his choices

known as the *weak monotonicity* property.

[6]As stated in Theorem 1 of Nishimura, Ok, and Quah (2017), their results apply to any preference relation and any choice function, imposing no conditions on their domains.

[7]Cosaert and Demuynck (2015) also show in their Theorem 2 that this adapted criterion, in their formulation, is a necessary and sufficient condition for choice consistency with utility maximization.

do not necessarily satisfy GARP, as the following example shows. Consider two menus, $A = \{x,y,z\}$ and $B = \{u,v,w\}$ with $z \gg u$ and $w \gg x$. Suppose that the DM's preferences are described by $z \succeq w \succeq x \succeq u \succeq v \succeq y$ and his consideration sets are $\gamma(A) = \{x,y\}$ and $\gamma(B) = \{u,v\}$. Consequently, the DM's choices under the direct procedure are $c(A) = x$ and $c(B) = u$. In this case, we have xRu but $uR^S x$, and we say that the ordered pair (x,u) constitutes a violation of GARP.

How does the number of GARP violations depend on the size of consideration sets under the direct procedure? Consider a different case where the DM has full consideration. In this case, his choices under the direct procedure are $\tilde{c}(A) = z$ and $\tilde{c}(B) = w$, satisfying GARP. Intuitively, the number of GARP violations weakly decreases in the expansion of consideration sets because the DM would not make worse choices by attending to additional options. Furthermore, it is equivalent for choices to be rationalized by the direct procedure with full consideration and by standard preference maximization.

The following remark summarizes the above discussion and will be useful later for formulating our hypothesis.

Remark 1. *Let c, $\tilde{c}$ be two direct choices, the following statements are true:*

(i) c does not necessarily satisfy GARP.

(ii) The number of GARP violations in c is weakly greater than that in $\tilde{c}$ if c ($\tilde{c}$, respectively) is a direct choice with a preference relation $\succeq$ and a consideration set mapping γ ($\tilde{\gamma}$, respectively) such that $\gamma(A) \subseteq \tilde{\gamma}(A)$ for all $A \in \mathscr{X}$.

(iii) c satisfies GARP if and only if c is a direct choice with full consideration.

2.2 Sequential Elimination

Remark 1 implies that the DM, under the direct procedure, may miss the best options by not giving menus full consideration, thus making choices inconsistent with preference maximization, especially when he considers only a small number of options. To address this problem, we propose sequential elimination, in which the DM eliminates options one by one until only one survives, i.e., the choice.

To illustrate sequential elimination, consider again that the DM faces the menu A. Under this procedure, he goes through two rounds of elimination to make a choice from A. In the first round, he eliminates $e_1(A) = y$, leaving the menu to be $A \backslash \{y\} = \{x,z\}$. In the second round, the DM confronts $\{x,z\}$ as a "new" menu, from which he eliminates $e_2(A) = x$, which reduces the menu to be $A \backslash \{y,x\} = \{z\}$—representing his choice.

Formally, an elimination function e assigns to every $A \in \mathscr{X}$ a sequence $e(A) = (e_1(A), \ldots, e_{|A|}(A)) \in X^{|A|}$ such that $\bigcup_{r=1}^{|A|} \{e_r(A)\} = A$. The sequence $e(A)$ fully describes the DM's elimination behavior when faced with a non-singleton menu A: he eliminates $e_1(A), \ldots, e_{|A|-1}(A)$ sequentially, and finally chooses $e_{|A|}(A)$ from A. For all $A \in \mathscr{X}$ and $r = 1, .., |A|$, let A_r denote the remaining menu before the rth round of elimination by $A_r = \bigcup_{s=r}^{|A|} \{e_s(A)\}$. We propose the following model of sequential elimination.

Definition 3. A choice function c is a *choice by sequential elimination* if there exist a preference relation $\succeq$, a consideration set mapping γ, and an elimination function e such that for all A and $r = 1, ..., |A|$,

(i) $e_r(A) \in \gamma(A_r)$;

(ii) $\{x \in \gamma(A_r) | x \succeq e_r(A), x \neq e_r(A)\} \neq \emptyset$ if $|A_r| \geq 2$;

(iii) $e_{|A|}(A) = c(A)$.

The first two conditions of Definition 3 state that the DM eliminates an option from his consideration set if he prefers another option in this set. In other words, despite limited attention, the DM compares at least two options according to his preferences in every elimination. The third condition relates an elimination data set to a choice data set by designating the last remaining option as the choice.

The following proposition formally establishes the consistency of individual choice behavior under sequential elimination. Proofs are in Appendix A.1.

Proposition 1. *Let c be a choice function. c satisfies GARP if and only if c is a choice by sequential elimination.*

Proposition 1 demonstrates that the DM always makes choices consistent with preference maximization under sequential elimination. Thanks to the minimum attention property, one of the best options in a menu survives in every elimination, based on one or the other of the following two cases. One is that the DM does not attend to this option, leaving it on the menu. The other is that he considers this option, which beats all the others in his consideration set. In essence, rather than choosing directly from an overwhelming menu, the DM systematically makes a sequence of elimination (sub)decisions, each within his attentional capacity.

2.3 Testable Implication

The most straightforward approach to validating our framework is to directly test choice consistency under the direct procedure and under sequential elimination, as outlined in Remark 1 and Proposition 1, respectively. Preserving the parsimony of our framework, however, we cannot rule out the possibility of other factors causing choice inconsistency, such as deliberate inconsistency (e.g., Kahneman, 2003; DellaVigna, 2009), (in)experience (List and Millimet, 2008), and socioeconomic background (e.g., Choi et al., 2014; Fisman et al., 2015; Cappelen et al., 2023). Therefore, we propose comparing the consistency of choices between sequential elimination and the direct procedure, assuming that other sources of inconsistency are parallel across the two procedures.

Considering individuals with limited attention represented by our DM, Remark 1 and Proposition 1 lead to the following hypothesis.[8]

Hypothesis 1. *Sequential elimination, as compared with the direct procedure, reveals a higher level of consistency in the choices of individuals with limited attention.*

Empirically, identifying individuals with limited attention from choice data remains a notable challenge. Nevertheless, cognitive ability can serve as a feasible and reliable proxy for drawing such inferences due to its decisive role in attentional capacity (Kahneman, 1973). Research from the cognitive sciences has consistently indicated that lower cognitive abilities are associated with more severe attentional constraints (e.g., Cowan et al., 2006; Unsworth, 2015).[9] Therefore, our test of Hypothesis 1 is primarily drawn from individuals with low cognitive ability in a general sample.

The hypothesis is falsifiable with two possible scenarios in a sample: either limited attention is not a significant issue, as verifiable by high levels of choice consistency and cognitive ability across both procedures; or other factors of inconsistency outweigh limited attention, as demonstrable by uniformly low levels of choice consistency.

[8]Remark 1 and Proposition 1 also imply that the underlying choice procedure remains unidentified when choices satisfy GARP. We do not delve into the identification of choice procedures in this context, given that our primary focus is on addressing choice inconsistency under limited attention.

[9]Further discussions on cognitive functions related to limited attention are provided in Section 3.2.3.

3 Experimental Design

3.1 Overview

Our experiment is structured as follows. Upon starting the experiment, subjects are randomly assigned to one of three treatments: Sequential Elimination, Direct Procedure, or Procedure Preference. They engage in economic decision-making under their assigned choice procedures, followed by cognitive ability tests. The experiment concludes with a survey on attitudes toward inconsistency and demographic information. The details of the experimental design are discussed below, accompanied by experimental instructions and screenshots available in Appendix B.

3.2 Main Design

3.2.1 Measuring Economic Rationality

Our experiment assesses economic rationality using twenty risky decision problems adapted from Kim et al. (2018). Each problem comprises eleven distinct options presented in random order. Each option, denoted as (x_1, x_2), yields x_1 or x_2 tokens with equal probability.[10] Additionally, we include a comprehension check problem.[11] As guided by our framework, this design poses a significant challenge for subjects to consider all options within each problem, despite the simplicity of individual options.

Our primary measure of economic rationality assigns a value of 1 to choices that are consistent with preference maximization (i.e., no GARP violations), and 0 otherwise. We refer to this measure as *consistency*. To account for FSD, a fundamental property in decision-making under risk, we employ a test of choice consistency complying with FSD, termed *FSD-GARP*. This criterion modifies GARP by imposing FSD instead of monotonicity in defining revealed preferences. Formal details are provided in Appendix A.2. Our second measure, referred to as *FSD-consistency*, assigns a value of 1 to choices that are consistent with maximizing a preference relation that respects FSD (i.e., no FSD-GARP violations), and 0 otherwise.

[10] These problems are derived from unique budget lines, each characterized by a specific price-endowment combination. See Appendix B for graphical representations of decision problems and a GARP violation in a two-dimensional space.

[11] The comprehension check problem consists of nine options: (11, 11), (22, 22), (33, 33), (44, 44), (55, 55), (66, 66), (77, 77), (88, 88), (99, 99). Choosing any option other than (99, 99) indicates a lack of comprehension.

These two measures provide binary indicators of economic rationality. To quantify deviations from economic rationality, we count the number of GARP and FSD-GARP violations, following prior studies (e.g., Famulari, 1995; Harbaugh, Krause, and Berry, 2001; Andreoni and Miller, 2002). We also apply variants of the Houtman–Maks index computed based on the GARP and FSD-GARP criteria, referred to as *HMI* and *FSD-HMI*. These indices represent the minimal numbers of choice observations that need to be removed to achieve choice consistency without and with respecting FSD, respectively. A common interpretation of the HMI is that it indicates decision-making mistakes, such as individuals missing the best options in some decision problems.[12] In other words, higher values of the HMI imply more mistakes from overlooking the best options, offering meaningful insights into the extent to which limited attention is mitigated. Accordingly, fewer GARP or FSD-GARP violations, or a lower HMI or FSD-HMI, signify a higher degree of economic rationality.[13]

3.2.2 Treatment Conditions

In each treatment, subjects choose an option from a vertical list of options on the screen's left side for every decision problem, with a practice trial provided initially for each procedure.[14] In *Sequential Elimination*, subjects make a choice by sequentially eliminating all other options, clicking to remove each to a *trash* box on the screen's right side. To reduce errors due to trembles or unfamiliarity, they can reinstate any eliminated option from the trash box to the decision problem list with a click.

The *Direct Procedure* provides comparable instructions and user interfaces as Sequential Elimination. We acknowledge that the interactive nature of Sequential Elimination, which necessitates multiple clicks, might result in increased engagement with each option relative to treatments that require a single click to indicate a choice. Such interactions could potentially account for any observed treatment differences. However, this falls outside of our framework and could obscure interpretations of experimental results related to choice procedures. Thus, in the Direct Procedure, subjects make a choice after sequentially *examining* all options, clicking

[12] Since all subjects are evaluated using the same set of twenty problems, we use the (FSD-)HMI as the minimal removal of choice observations rather than as a proportion of the total number of observations. This facilitates direct interpretation of results; for example, an HMI of 1 can indicate one choice mistake.

[13] Alternative rationality measures involve adjusting expenditures to achieve consistency of choices from linear budget sets, as proposed by Afriat (1973), Varian (1990), and Halevy, Persitz, and Zrill (2018). These measures are not directly applicable to our study, which focuses on finite choice sets without imposing budgets. See Apesteguia and Ballester (2015), Cosaert and Demuynck (2015), and Halevy, Persitz, and Zrill (2018) for detailed discussions.

[14] The Procedure Preference group receives a trial problem for each procedure in random order.

to move each to a *choice list* box on the screen's right side.[15] Subjects finalize their choices from the choice list box once it encompasses all available options.

This experimental design presents two key advantages. First, the Direct Procedure encourages moderate effort from subjects to engage with every option, thereby facilitating a clear interpretation of economic rationality concerning individuals' limited attention spans. Second, these two treatments expose options to subjects similarly, differing only in their decision-making mechanics. Contrasting these treatments enables a thorough evaluation of how sequential elimination, distinguished by its procedural feature, mitigates the impacts of limited attention.

While Sequential Elimination is designed to steer subjects toward using the corresponding choice procedure, the actual extent of its adherence requires additional verification. The third treatment, Procedure Preference, addresses this by having subjects choose between the Direct Procedure and Sequential Elimination for decision-making. This allows us to assess whether sequential elimination aligns with individual preferences, particularly among those with limited attention, indicating the potential for non-coercive applications of the procedure. This treatment also helps identify factors influencing preferences for sequential elimination. Furthermore, by comparing the economic rationality across groups, we can discern if sequential elimination's efficacy varies when selected in alignment with preferences versus assigned.

3.2.3 Measuring Cognitive Ability

Cognitive ability is measured using IQ scores obtained through the ICAR test, comprising five matrix reasoning and five three-dimensional rotation questions, which are considered the primary indicators of problem-solving and reasoning abilities (Nisbett et al., 2012). In addition, we assess two cognitive functions associated with limited attention, selective attention and working memory capacity. Selective attention refers to the ability to differentially process simultaneous information (Johnston and Dark, 1986). It is measured using the Stroop test (Stroop, 1935), wherein subjects identify the print color of incongruent words, such as "GREEN" printed in red. Working memory capacity, defined as the ability for "temporary storage and manipulation of information" (Baddeley, 1992), is systematically linked to attentional constraints (Unsworth et al., 2014; Oberauer, 2019). This is measured through the Sternberg test (Sternberg, 1966), which tasks subjects to remember and recognize sequences of num-

[15] To minimize potential treatment differences arising from procedure names, we introduce the Direct Procedure to subjects as *Sequential Examination*.

bers.[16]

3.3 Other Design Details

3.3.1 Measuring Attitude toward Inconsistency

Our examination of sequential elimination's effect is enhanced by incorporating the influence of deliberate choice inconsistency, informed by prior research (e.g., Kahneman, 2003; DellaVigna, 2009). We evaluate individual attitudes toward inconsistency via a decision-making scenario featuring the attraction effect, a well-documented example of choice inconsistency (e.g., Huber, Payne, and Puto, 1982; Tversky and Simonson, 1993). Subjects are asked to rate how at ease they are with the inconsistency scenario on a 0 (least) to 10 (most at ease) scale, where higher scores reflect a less negative attitude.

3.3.2 Choice Revision

To further elucidate the underlying mechanism of sequential elimination, we incorporate a choice revision procedure into the experimental design. This procedure offers individuals an opportunity to revise their choices, with recent studies showing its effect in enhancing choice compliance with normative axioms, particularly in contexts with a relatively small number of options. Conceivably, choice revision may lead participants to reconsider all options, albeit still within the constraints of limited attention. Thus, if our experiment identifies an effect of sequential elimination but not of choice revision, it would indicate the persistence of limited attention and underscore sequential elimination's role in addressing it.

The specifics of our choice revision design are as follows. In the economic decision-making task, subjects engage successively with two identical sets of the aforementioned decision problems, Blocks A and B. Orderings of decision problems within each block are randomized and independent. Subjects are not informed of the two blocks' identical nature until they reach Block B. In Block B, the choice made in Block A for each problem is highlighted. Subjects can restart their assigned choice procedure (by clicking on any option) or retain their

[16]In the Sternberg test, subjects see a sequence of numbers presented singly and are tasked with memorizing them. After the display of several numbers, there is a brief pause, followed by the presentation of a test number. Subjects are asked whether the test number was included in the previously displayed sequence. Each trial concluded with subjects recalling the sequence. The IQ scores, selective attention scores, and working memory scores are integers from 0 to 10, 0 to 20, and 0 to 10, respectively, reflecting the number of correct responses on their respective tests.

Block A choices (via a shortcut button). To ensure incentive compatibility across blocks, subjects must designate one block for payment, from which a decision problem is randomly drawn to determine their payoff.[17] Our design does not impart normative axioms to subjects to ensure comparability between choice revision and sequential elimination.[18] Our primary analysis of sequential elimination focuses on choices made in Block A. We investigate choice revision by comparing economic rationality before and after modification, specifically among subjects who alter any choice in Block B and select Block B for payment.

3.4 Experimental Procedure

The experiment was conducted online on the Qualtrics platform between May 31 and June 1, 2020. Subjects were recruited from the Prolific subject pool and could withdraw from the experiment at any time with no need for justification. Upon completing the experiment, subjects received a participation fee of £3 and an additional payment of up to £14.6 contingent on their economic decisions and cognitive test performance. Payoffs based on earned tokens were distributed three days post-experiment through Prolific. The experiment averaged 42 minutes to complete, with a mean payout of £8.14.

4 Experimental Results

4.1 Sample

Our sample comprises 223 subjects (50.2% female) with 73-75 observations per treatment condition.[19] Appendix C presents descriptive statistics of the sample and balance checks (Table C.1), along with histograms (Figures C.1 and C.2). By design, cognitive and demographic factors, as well as attitudes toward inconsistency are balanced across all three treatment groups. The mean age is approximately 23.731, and 75.3% of the subjects are between 18 and 25 years old. All subjects have completed at least secondary education. 57.0% of subjects are engaged in undergraduate studies, and 33.2% have attained at least an undergraduate degree. Therefore,

[17] The payment block structure emphasizes the unique rewards of each problem, thereby minimizing the possibility of deliberate choice variations in repetitive decision problems, as suggested by Agranov and Ortoleva (2017).

[18] Yu, Zhang, and Zuo (2021) show that their choice revision treatment, which also provides no explicit guidance, improves decision-making quality in a multiple price list setting.

[19] A total of 253 (53.0% female) subjects were recruited and thirty subjects who did not pass the comprehension check were excluded from the analysis.

our participant sample is likely younger and more educated than the general population. To test Hypothesis 1, our primary focus is on *low-IQ* subjects (those with IQ scores below or equal to the sample median) as a proxy for individuals with limited attention. We also examine the implications of sequential elimination for *high-IQ* subjects (those with IQ scores above the sample median) and for all subjects.[20] Appendix Table C.2 displays the subject breakdown by treatment and IQ group.

4.2 Effect of Sequential Elimination

Tables 1 and 2 summarize our descriptive findings. Panel A of the first table shows a substantial increase of 26.3 percentage points (63.8%) in the proportion of low-IQ subjects attaining choice consistency under Sequential Elimination as compared with their counterparts under the Direct Procedure (0.675 vs. 0.412; $p = 0.042$, chi-square test). Additionally, these subjects commit 45.8% fewer GARP violations under Sequential Elimination (5.275 vs. 9.735; $p = 0.010$, Mann–Whitney U test) and exhibit 41.6% lower HMI values (0.550 vs. 0.941; $p = 0.023$, Mann–Whitney U test). These findings strongly support Hypothesis 1.

We then examine economic rationality measures respecting stochastic dominance. The proportion of low-IQ subjects achieving FSD-consistency rises by 21.0 percentage points (79.2%) under Sequential Elimination relative to the Direct Procedure (0.475 vs. 0.265), though the difference in the distributions is marginally significant ($p = 0.106$, chi-square test). Nevertheless, the improvements in their FSD-GARP violations and FSD-HMI remain significant ($p = 0.019$ and $p = 0.056$, Mann–Whitney U test, respectively). Furthermore, Appendix Figures D.1 and D.2 depict the empirical cumulative distributions of the intensive measures for different IQ groups, showing pronounced upward shifts among low-IQ subjects from the Direct Procedure to Sequential Elimination.

In contrast, Panel B of Table 1 reveals no discernible disparity in economic rationality among high-IQ subjects across the two treatment groups across the measures. This is due to their high levels of economic rationality, maintained regardless of the choice procedure. Within the Direct Procedure group, low-IQ subjects exhibit lower levels of economic rationality than their high-IQ counterparts. This observation aligns with prior studies (e.g., Burks et al., 2009;

[20]The sample's IQ scores range from 0 to 10, with the first and third quantiles at 3 and 6, respectively. The mean IQ of the sample is approximately 4.740, with a median of 4 and a standard deviation of approximately 2.467. Therefore, low-IQ (high-IQ, respectively) subjects identically match those with IQ scores below (above, respectively) the sample mean IQ score.

Cappelen et al., 2023; Echenique, Imai, and Saito, 2023), reflecting low-IQ subjects' susceptibility to limited attention. Appendix Table D.1 reports significant differences in economic rationality between low-IQ and high-IQ subjects under the Direct Procedure across all measures except for FSD-consistency. This may be attributed to subjects' typically lower rates of FSD-consistency (relative to their consistency rates) across cognitive abilities and treatment conditions.[21]

Table 2 evaluates the overall impact of Sequential Elimination. Subjects under Sequential Elimination show a higher level of choice consistency than those under the Direct Procedure, although only the difference in GARP violations is approaching statistical significance ($p = 0.125$, Mann–Whitney U test). This suggests that Sequential Elimination primarily improves choice consistency among low-IQ subjects, consistent with our framework. However, the significant differences in the distributions of FSD-GARP and FSD-HMI ($p = 0.061$ and $p = 0.039$, respectively, Mann–Whitney U test) indicate potential complementarities between Sequential Elimination and cognitive ability in meeting more stringent criteria of economic rationality.

Our analysis proceeds by estimating the impact of Sequential Elimination on economic rationality, incorporating the potential influence of other factors (e.g., cognitive functions and demographics), as presented in Table 3. Columns 1 and 2 estimate the probabilities of achieving consistency and FSD-consistency through logistic regressions, while Columns 3 to 6 examine other measures via negative binomial regressions.[22]

Results consistently hold across all measures, further fortifying support for our hypothesis. In Column 1, significant positive coefficients are observed for Sequential Elimination on consistency and its interaction with high-IQ. To provide a more accessible interpretation, we compute marginal effects based on estimated coefficients as the average change in measures upon switching from the Direct Procedure to Sequential Elimination across observations. This indicates that Sequential Elimination boosts the probability of choice consistency among low-IQ subjects by 23.3 percentage points, an improvement of over 53.8% relative to their estimated consistency probability (0.433) under the Direct Procedure. Similarly, Column 2 shows a 21.0

[21] Appendix Table D.2 presents results from the paired samples Wilcoxon test across different groups, rejecting the hypothesis that the distributions of FSD-consistency and consistency are equal.

[22] Negative binomial regressions are employed due to their suitability for count data and skewed distributions (Cameron and Trivedi, 2013). This distribution is preferred over the Poisson distribution when the assumption of equal conditional mean and variance does not hold, as it accounts for data dispersion. Dispersion parameters are reported in logarithmic form in the corresponding tables.

TABLE 1: Economic Rationality by Treatments among IQ Groups

	Overall Mean (1)	Sequential Elimination Mean (2)	Direct Procedure Mean (3)	Sequential Elimination vs. Direct Procedure: Mean Difference (4)	Sequential Elimination vs. Direct Procedure: *p*-value (5)
Panel A: Low-IQ Subjects					
Consistency	0.554	0.675	0.412	0.263	0.042
	(0.058)	(0.075)	(0.086)	(0.114)	
FSD-Consistency	0.378	0.475	0.265	0.210	0.106
	(0.057)	(0.08)	(0.077)	(0.111)	
GARP Violations	7.324	5.275	9.735	-4.460	0.010
	(1.803)	(2.48)	(2.602)	(3.595)	
FSD-GARP Violations	31.257	26.575	36.765	-10.190	0.019
	(6.536)	(9.658)	(8.619)	(12.944)	
HMI	0.730	0.550	0.941	-0.391	0.023
	(0.121)	(0.168)	(0.169)	(0.238)	
FSD-HMI	1.608	1.350	1.912	-0.562	0.056
	(0.225)	(0.311)	(0.323)	(0.448)	
Observations	74	40	34		
Panel B: High-IQ Subjects					
Consistency	0.662	0.636	0.683	-0.047	0.862
	(0.055)	(0.085)	(0.074)	(0.112)	
FSD-Consistency	0.446	0.485	0.415	0.070	0.712
	(0.058)	(0.088)	(0.078)	(0.118)	
GARP Violations	2.514	2.485	2.537	-0.052	0.651
	(0.696)	(0.857)	(1.059)	(1.363)	
FSD-GARP Violations	15.892	9.455	21.073	-11.619	0.707
	(4.361)	(2.722)	(7.508)	(7.986)	
HMI	0.446	0.515	0.390	0.125	0.597
	(0.082)	(0.138)	(0.098)	(0.17)	
FSD-HMI	1.027	0.727	1.268	-0.541	0.240
	(0.18)	(0.159)	(0.296)	(0.336)	
Observations	74	33	41		

Note: The table compares economic rationality between the Direct Procedure and Sequential Elimination for both low-IQ and high-IQ subjects. Column 1 shows the overall mean values. Columns 2 and 3 detail treatment-specific mean values. Column 4 presents the differences between these mean values. Column 5 provides p-values derived from chi-square tests for consistency and FSD-consistency, as well as Mann–Whitney U tests for other measures. Standard errors are shown in parentheses.

TABLE 2: Overall Economic Rationality by Treatments

	Overall Mean	Sequential Elimination Mean	Direct Procedure Mean	Sequential Elimination vs. Direct Procedure: Mean Difference	Sequential Elimination vs. Direct Procedure: p-value
	(1)	(2)	(3)	(4)	(5)
Consistency	0.608	0.658	0.560	0.098	0.295
	(0.04)	(0.056)	(0.058)	(0.08)	
FSD-Consistency	0.412	0.479	0.347	0.133	0.141
	(0.041)	(0.059)	(0.055)	(0.081)	
GARP Violations	4.919	4.014	5.800	-1.786	0.125
	(0.983)	(1.414)	(1.369)	(1.968)	
FSD-GARP Violations	23.574	18.836	28.187	-9.351	0.061
	(3.966)	(5.494)	(5.701)	(7.917)	
HMI	0.588	0.534	0.640	-0.106	0.232
	(0.074)	(0.11)	(0.098)	(0.148)	
FSD-HMI	1.318	1.068	1.560	-0.492	0.039
	(0.146)	(0.187)	(0.22)	(0.289)	
Observations	148	73	75		

Note: The table compares economic rationality between the Direct Procedure and Sequential Elimination for all subjects. Column 1 shows the overall mean values. Columns 2 and 3 detail treatment-specific mean values. Column 4 presents the differences between these mean values. Column 5 provides p-values derived from chi-square tests for consistency and FSD-consistency, as well as Mann–Whitney U tests for other measures. Standard errors are shown in parentheses.

percentage point increase in their probability of FSD-consistency due to Sequential Elimination, corresponding to 75% of their probability (0.280) under the Direct Procedure.

In addition, Columns 3 and 4 illustrate that Sequential Elimination significantly reduces the count of GARP and FSD-GARP violations among low-IQ subjects by 9.229 and 41.422, respectively, amounting to 67.4% and 69.6% of the estimated violations under the Direct Procedure (13.703 and 59.491). Columns 5 and 6 also reveal a considerable decrease in the HMI and FSD-HMI among low-IQ subjects attributed to Sequential Elimination, by 0.305 and 0.756, respectively, although the former is moderately significant ($p = 0.158$). These decreases represent 35.5% and 39.0% of the estimated values (0.859 and 1.939) under the Direct Procedure, respectively.

At the aggregate level, the improvement of Sequential Elimination emerges among the measures incorporating stochastic dominance, in line with the descriptive findings. Specifically, Sequential Elimination substantially ameliorates FSD-consistency by 0.131, albeit marginally significant ($p = 0.104$), while significantly reducing FSD-GARP violations by 29.909 and FSD-HMI by 0.702. This finding highlights the potential of Sequential Elimination to enhance economic rationality beyond individuals with low cognitive ability.

4.2.1 Alternative Specifications

Furthermore, we examine the effect of Sequential Elimination among subjects categorized based on their IQ scores across different distribution tiers, first by terciles and then by quartiles, as detailed in Appendix Tables D.3 and D.4, respectively. A uniform pattern emerges in terms of economic rationality respecting stochastic dominance. The odd-numbered columns in the tables show that Sequential Elimination improves consistency among subjects with the lowest IQ scores, with magnitudes surpassing that identified among low-IQ subjects. Meanwhile, the even-numbered columns reveal reduced inconsistencies respecting FSD among those in the middle tiers. For example, the first and second columns of Appendix Table D.3 indicate a rise of 29.1 and 33.1 percentage points in consistency and FSD-consistency for those in the lowest and second terciles, respectively.

These findings reinforce the economically meaningful impact of sequential elimination. Moreover, they are in line with those of Polisson, Quah, and Renou (2020), providing additional evidence that compliance with stochastic dominance is more rigorous. In other words, deviations from such requirements may stem from factors besides limited attention. More

TABLE 3: Effect of Sequential Elimination on Economic Rationality

	Consistency (1)	FSD-Consistency (2)	GARP Violations (3)	FSD-GARP Violations (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Sequential Eliminatio	1.025*	0.976*	-1.119**	-1.192**	-0.439	-0.495*
	(0.526)	(0.550)	(0.521)	(0.489)	(0.323)	(0.269)
High-IQ	1.131**	0.614	-1.803***	-0.886*	-0.772**	-0.325
	(0.520)	(0.542)	(0.461)	(0.473)	(0.320)	(0.309)
Sequential Elimination	-1.338*	-0.718	1.331**	0.263	0.770	-0.113
$\times$ High-IQ	(0.731)	(0.727)	(0.674)	(0.670)	(0.475)	(0.406)
Panel B: Marginal Effects of Sequential Elimination						
Low-IQ Subjects	0.233**	0.210*	-9.229*	-41.422*	-0.305	-0.756*
	(0.116)	(0.113)	(5.121)	(22.495)	(0.216)	(0.425)
High-IQ Subjects	-0.067	0.059	0.533	-14.832	0.156	-0.638*
	(0.109)	(0.113)	(1.253)	(9.661)	(0.165)	(0.385)
All Subjects	0.081	0.131	-4.514	-29.909**	-0.085	-0.702**
	(0.080)	(0.081)	(2.972)	(14.753)	(0.137)	(0.298)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha			1.678***	1.554***	-1.625*	-0.410
			(0.160)	(0.128)	(0.911)	(0.325)
Log Likelihood	-90.966	-92.411	-285.583	-486.392	-142.350	-224.534
Observations	148	148	148	148	148	148

Note: This table estimates the effect of sequential elimination on economic rationality. Columns 1 and 2 present logistic regression results for consistency and FSD-consistency. Columns 3 to 6 display negative binomial regression results for GARP and FSD-GARP violations, as well as the HMI and FSD-HMI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different groups, indicating the average change in the dependent variables upon switching from the Direct Procedure to Sequential Elimination across observations. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

broadly, our findings suggest that combining sequential elimination with adequate cognitive ability can enhance economic rationality by addressing factors beyond limited attention.

4.3 Procedural Preferences

We examine the factors influencing individual preference for sequential elimination by leveraging the Procedure Procedure treatment. In this treatment, 82.1% (32 out of 39) of low-IQ subjects select Sequential Elimination over the Direct Procedure. On the other hand, 47.2% (17 out of 36) of high-IQ subjects opt for Sequential Elimination, reflecting their indifference between the two procedures. This is consistent with their almost identical levels of economic rationality in both procedures. The substantial difference in the choice of procedures between low-IQ and high-IQ subjects suggests a negative relationship between cognitive ability and the preference for sequential elimination.

This relationship is examined using logistic regressions on the probability of selecting Sequential Elimination given various sets of potential contributing factors, as detailed in Table 4. Column 1 shows significantly negative coefficients for IQ and working memory, considering only cognitive ability. These estimates remain virtually unchanged when demographics and attitudes toward inconsistency are progressively included in Columns 3 and 4, indicating a stronger preference for Sequential Elimination among those with lower cognitive abilities. Education positively influences this procedural preference, as indicated by the consistent coefficients in the last three columns. This suggests that education may play a key role in promoting the adoption of sequential elimination. These results are robust to specifications incorporating the binary high-IQ indicator instead of the IQ variable, as detailed in Appendix Table D.5.

TABLE 4: Determinants of Individual Preference for Sequential Elimination

	Selecting Sequential Elimination			
	(1)	(2)	(3)	(4)
IQ	-0.286**		-0.276**	-0.254*
	(0.121)		(0.129)	(0.133)
Selective Attention	-0.124		-0.128	-0.145
	(0.098)		(0.107)	(0.104)
Working Memory	-0.194*		-0.215*	-0.228*
	(0.112)		(0.116)	(0.130)
Education		0.567**	0.574**	0.663**
		(0.285)	(0.285)	(0.279)
Age				-0.024
				(0.043)
Female				0.684
				(0.587)
Attitude toward Inconsistency				0.020
				(0.123)
Log Likelihood	-40.471	-45.901	-38.395	-37.630
Observations	75	75	75	75

Note: This table examines the determinants of individual preference for Sequential Elimination using logistic regressions on the probability of selecting it in the Procedure Preference treatment. The dependent variable is binary, with 1 indicating a choice for Sequential Elimination and 0 otherwise. All models include a constant term. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.3.1 Impacts of Procedural Preferences

We further investigate the relationship between procedural preferences and economic rationality. Table 5 focuses on consistency measures for illustration, while similar results on the other measures are reported in Appendix D.2. The first two columns in the table compare subjects who select Sequential Elimination (in the Procedure Preference treatment) with those assigned to it. The estimates show no significant impact of a preference for Sequential Elimination on either consistency or FSD-consistency, nor on the other measures (see Appendix Tables D.6 and D.7). This demonstrates comparable levels of economic rationality under sequential elimination, regardless of whether the procedure is fully aligned with individual preferences or assigned.

The middle two columns replicate this analysis in the Direct Procedure context. While no significant effect on consistency is detected for a preference for the Direct Procedure (Column 3), a significant positive coefficient emerges for FSD-consistency (Column 4). The estimates indicate that low-IQ subjects who select the Direct Procedure reveal a higher FSD-consistency rate (38.8 percentage points) relative to those under assignment. This elevated level of economic rationality is also evidenced by the FSD-HMI, as displayed in Appendix Table D.7. Notably, among low-IQ subjects who opt for the Direct Procedure, the majority (approximately 57.1%) make choices satisfying not only the GARP but also the FSD-GARP criteria, signifying a high level of economic rationality. Our preferred interpretation is that they decide on the Direct Procedure, to some extent, as if by recognizing their ability to make high-quality decisions.[23]

The last two columns examine the collective impact of the Procedure Preference treatment, using those assigned to the Direct Procedure as the baseline. Significant coefficients of Procedure Preference on economic rationality are observed. According to the estimates, the Procedure Preference treatment significantly raises consistency and FSD-consistency among low-IQ subjects by 28.5 and 21.6 percentage points, resembling that observed with the Sequential Elimination treatment, both quantitatively and qualitatively (as illustrated in Columns 1 and 2 of Table 3). The observed impact remains significant when evaluated based on the number of FSD-GARP violations and the FSD-HMI, alongside marginal significance for GARP violations ($p = 0.131$) and the HMI ($p = 0.113$), as detailed in Appendix Tables D.6 and D.7.[24]

[23] One possibility is that these individuals possess decision-making skills and expertise, such as the use of heuristics and rules (Gigerenzer and Todd, 1999; Halevy and Mayraz, 2022).

[24] Appendix Table D.7 shows that for high-IQ subjects who select the Direct Procedure, this preference corre-

To summarize, our analysis indicates that individuals with low cognitive ability, who may be more subject to limited attention, reveal a pronounced preference for sequential elimination. Consequently, sequential elimination may inherently improve their economic rationality by aligning with their procedural preferences.

TABLE 5: Impacts of Procedure Preference on Economic Rationality

	Sequential Elimination Selected vs. Assigned		Direct Procedure Selected vs. Assigned		Procedure Preference vs. Direct Procedure	
	Consistency (1)	FSD-Consistency (2)	Consistency (3)	FSD-Consistency (4)	Consistency (5)	FSD-Consistency (6)
Panel A: Regression Coefficients						
Procedure Preference	0.342	-0.038	0.879	1.832*	1.289**	1.018*
	(0.565)	(0.561)	(0.910)	(0.943)	(0.525)	(0.556)
High-IQ	-0.357	-0.387	1.285**	0.973	1.229**	0.761
	(0.567)	(0.546)	(0.555)	(0.609)	(0.546)	(0.565)
Procedure Preference	-0.458	0.373	-1.737	-1.726	-2.034***	-0.809
× High-IQ	(0.833)	(0.835)	(1.103)	(1.132)	(0.734)	(0.761)
Panel B: Marginal Effects of Procedure Preference						
Low-IQ Subjects	0.063	-0.008	0.208	0.388**	0.285**	0.216*
	(0.103)	(0.119)	(0.208)	(0.182)	(0.112)	(0.110)
High-IQ Subjects	-0.025	0.071	-0.196	0.024	-0.162	0.047
	(0.134)	(0.131)	(0.139)	(0.140)	(0.108)	(0.111)
All Subjects	0.028	0.026	-0.033	0.172	0.057	0.128*
	(0.084)	(0.089)	(0.118)	(0.112)	(0.078)	(0.077)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	-71.341	-75.014	-64.692	-61.004	-91.990	-92.460
Observations	122	122	101	101	150	150

Note: The table presents logistic regression results for the impacts of procedure preference on economic rationality, based on consistency and FSD-consistency. The first two columns compare the economic rationality of subjects who select Sequential Elimination in the Procedure Preference treatment with those assigned to it. The middle two columns perform a similar analysis for subjects who select the Direct Procedure against those assigned to it. The last two columns compare the Procedure Preference treatment with the Direct Procedure treatment. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Procedure Preference for different groups, indicating the average change in the dependent variables upon switching from the assigned procedures to the selected ones. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

sponds to an increase in their HMI values as compared with those assigned to it, although no significant differences in other measures are observed. This increase is also reflected in the impact of Procedure Preference among high-IQ subjects, suggesting that those with or desiring high levels of economic rationality tend to opt for Sequential Elimination.

5 Further Discussion

Our investigation expands in several directions to enhance our understanding of limited attention and sequential elimination. We begin by examining the relationship between decision time and economic rationality, exploring its interaction with choice procedures. We then present our analysis of the impact of choice revision on economic rationality, which illuminates the persistence of limited attention. Finally, we discuss the descriptive and normative roles of choice procedures in light of our results, culminating in the real-world impacts of sequential elimination.

5.1 Decision Time

As shown in Appendix Table C.1, subjects under Sequential Elimination spend considerably more time making decisions than those under the Direct Procedure (11.217 vs. 7.474 minutes; $p < 0.001$, Mann–Whitney U test). This pattern holds for both low-IQ and high-IQ subjects, whose decision times are similar within each procedure. These observations suggest that the improved economic rationality observed under Sequential Elimination can be partly attributed to increased decision time.

The impact of decision time on economic rationality under limited attention requires further investigation. While evidence from the cognitive sciences generally points to a negative correlation between decision time and choice errors (see, e.g., Heitz, 2014, for a review), some studies indicate a positive correlation (e.g., Luce, 1991; Ratcliff and McKoon, 2008). Economics research also notes that rapid responses resulting from high decision-making skills and extensive practice can be associated with high quality (Kahneman, 2003; Fudenberg, Strack, and Strzalecki, 2018).

To elucidate the mechanism of Sequential Elimination, we first estimate the overall impact of decision time on economic rationality, as shown in Appendix Table D.8. To aid interpretation, all non-binary variables are standardized to have a mean of zero and a variance of one. We find no significant impact of decision time on consistency indicators in the first two columns of the table. However, Columns 3 and 5 reveal significantly negative associations of decision time with GARP violations and the HMI, respectively. A one-standard-deviation increase in decision time corresponds to a reduction in GARP violations by 2.375, slightly less than the reductions associated with IQ and age (2.870 and 2.601, respectively).[25]

Appendix Table D.9 further includes a triple interaction term between decision time, Sequential Elimination, and high IQ. Here, no significant coefficients for decision time are identified, except for this interaction on GARP violations. The estimates indicate only a pronounced effect of decision time in reducing GARP violations among low-IQ subjects under Sequential Elimination. Given our previous results and those from prior research, Our preferred interpretation is that these subjects' increased decision time is effective in improving decision-making as their limited attention is mitigated. Collectively, our findings suggest that choice procedures can shape the relationship between decision time and economic rationality.

5.2 Choice Revision

Our estimations of the impact of choice revision incorporate a triple interaction involving choice revision, high IQ, and Sequential Elimination, accounting for potential interactions between choice procedures and limited attention, as detailed in Appendix Table D.10. Column 4 of the table demonstrates a significant impact of choice revision among high-IQ subjects in reducing their number of FSD-GARP violations. In Column 6, pronounced improvements in FSD-HMI due to choice revision are also observed for high-IQ subjects and at the aggregate level. In contrast, among low-IQ subjects, only those under Sequential Elimination reveal a notable decrease in FSD-HMI due to choice revision, with no significant changes otherwise.

Our analysis suggests that choice revision can enhance economic rationality under conditions where limited attention is mitigated, including the presence of high cognitive ability or Sequential Elimination, as aligned with our primary results. Improvements are observed specifically in measures incorporating FSD, indicating that choice revision primarily addresses other sources of deviations from economic rationality rather than limited attention itself. This underscores the persistent challenge of limited attention and the economic significance of Sequential Elimination. Furthermore, these results illustrate that the effectiveness of choice procedures hinges on their mechanisms regarding the root causes of deviations from rationality

[25] Our data indicate a positive association between age and economic rationality across almost all measures. This aligns with Dean and Martin (2016) but contrasts with Choi et al. (2014) and Echenique, Imai, and Saito (2023). The negative impact of age on decision-making may be due to cognitive decline associated with normal aging, an issue typically not faced by young individuals (Rönnlund et al., 2005).

5.3 Descriptive and Normative Roles

Our study sheds light on reconciling choice inconsistency with preference maximization within economic theories. In response to this anomaly, which undermines the cornerstone of neoclassical economics, extensive research has explored how choice procedures can *describe* choice inconsistency (e.g., Manzini and Mariotti, 2007; Masatlioglu and Nakajima, 2007; Salant, 2011). At the heart of the challenge lies the question of whether inconsistency and choice procedures are entrenched. Accordingly, we adopt an alternative approach, examining how varied choice procedures can *shape* economic rationality. Our findings enhance the descriptive theories by demonstrating the potential of choice procedures for normative applications, which warrant further investigation as suggested by Gilboa (2010).

While there may be arguments for emphasizing either the positive or normative roles of choice procedures, our findings suggest that these roles can be complementary, as supported by recent experimental studies (e.g., Benjamin, Fontana, and Kimball, 2020; Nielsen and Rehbeck, 2022; Breig and Feldman, 2024). The descriptive role of choice procedures may underpin their normative role. Our data from the Procedure Preference treatment indicate that alignment with individual procedural preferences is vital for the effectiveness of choice procedures. Moreover, the normative appeal of choice procedures can drive their actual adoption. Central to this discussion may be the level of public awareness regarding available procedures, which may be hindered by insufficient knowledge or external support. Therefore, it is a critical endeavor for economic research to clarify beneficial procedures, which, in turn, might prompt their adoption in society.

5.4 Real-World Implications

Our results, though derived from an experimental context, provide meaningful perspectives on the implications of sequential elimination in real-world scenarios characterized by limited attention. Given that our sample is primarily composed of young and educated individuals, our low-IQ subjects arguably represent the upper segment of the low cognitive ability spectrum in the general population. The effect of sequential elimination, which is more substantial among individuals with lower cognitive abilities, suggests that its significance may reach the wider low cognitive ability population—a sizable group particularly susceptible to limited attention. The efficacy of sequential elimination in narrowing the economic rationality gap between cognitively disadvantaged and advantaged individuals indicates a pathway toward reducing decision-making-driven economic inequality.

Our framework has the potential to enhance the implementation of sequential elimination by clarifying its mechanism to the public. In theory, to achieve consistency, individuals need only consider two alternatives at each elimination round. This is crucial for those with limited cognitive resources, yet it does not preclude the possibility that more cognitively adept individuals could achieve increased efficiency by concurrently eliminating multiple alternatives. Essentially, the procedure is effective as long as individuals eliminate strictly fewer alternatives than they can consider at once. Future research may aim to identify variations of sequential elimination that enhance its efficiency.

The simplicity and flexibility of sequential elimination position it as a viable strategy for policymakers and institutions to assist individuals in making consequential decisions at a relatively low cost. Our findings suggest that it might be sufficient to non-coercively offer the procedure to improve decision-making. Especially for those with low cognitive ability, this approach could facilitate more informed choices while respecting individual preferences, thus making it appealing for institutional design (Thaler and Sunstein, 2003; Chetty, 2015). For example, policymakers can integrate the procedure into various public service digital platforms, including government websites and mobile apps. Moreover, financial institutions could be required to provide sequential elimination for customers choosing among loan schemes, retirement plans, or insurance policies. We demonstrate the feasibility of these applications with an accessible implementation of sequential elimination, which is adaptable to various institutional frameworks.

6 Concluding Remarks

This paper presents a theoretical foundation and experimental validation for the efficacy of sequential elimination—a choice procedure well-grounded in the cognitive sciences (e.g., Tversky, 1972; Gigerenzer and Todd, 1999)—in improving economic rationality under limited attention. By identifying a parsimonious yet descriptively appealing assumption about individual attention, we develop a choice-theoretical framework that elucidates the instrumental role of sequential elimination in establishing choice consistency with preference maximization. Causal evidence for a sequential elimination effect is obtained for subjects engaged in a randomized controlled experiment involving risky decision-making. This effect bears substantial economic significance, notably for individuals with cognitive limitations. Our results enrich the literature by revealing aligned theoretical and empirical conditions of economic rationality.

Beyond decision-making under risk, examining the robustness of sequential elimination across diverse choice domains—such as consumer goods, intertemporal choices, and altruistic choices—is desirable. Perhaps most importantly, field studies into sequential elimination present a promising avenue for future research. Moreover, these efforts may catalyze the development of innovative choice procedures that yield economically meaningful improvements, particularly for individuals contending with fundamental challenges other than limited attention.

References

Abaluck, Jason, and Abi Adams-Prassl. 2021. "What do Consumers Consider Before They Choose? Identification from Asymmetric Demand Responses." *The Quarterly Journal of Economics* 136 (3): 1611–1663.

Afriat, Sidney N. 1967. "The Construction of Utility Functions from Expenditure Data." *International Economic Review* 8 (1): 67–77.

Afriat, Sydney N. 1973. "On a system of inequalities in demand analysis: an extension of the classical method." *International Economic Review* 460–472.

Agranov, Marina, and Pietro Ortoleva. 2017. "Stochastic Choice and Preferences for Randomization." *Journal of Political Economy* 125 (1): 40–68.

Andreoni, James, and John Miller. 2002. "Giving according to GARP: An experimental test of the consistency of preferences for altruism." *Econometrica* 70 (2): 737–753.

Apesteguia, Jose, and Miguel A. Ballester. 2013. "Choice by Sequential Procedures." *Games and Economic Behavior* 77 (1): 90–99.

Apesteguia, Jose, and Miguel A. Ballester. 2015. "A Measure of Rationality and Welfare." *Journal of Political Economy* 123 (6): 1278–1310.

Baddeley, Alan. 1992. "Working Memory." *Science* 255 (5044): 556–559.

Banks, James, Leandro S. Carvalho, and Francisco Perez-Arce. 2019. "Education, Decision Making, and Economic Rationality." *The Review of Economics and Statistics* 101 (3): 428–441.

Barseghyan, Levon, Francesca Molinari, and Matthew Thirkettle. 2021. "Discrete Choice under Risk with Limited Consideration." *American Economic Review* 111 (6): 1972–2006.

Benjamin, Daniel J., Mark Alan Fontana, and Miles S. Kimball. 2020. "Reconsidering Risk Aversion." National Bureau of Economic Research Working Paper 28007.

Besedeš, Tibor, Cary Deck, Sudipta Sarangi, and Mikhael Shor. 2015. "Reducing Choice Overload without Reducing Choices." *The Review of Economics and Statistics* 97 (4): 793–802.

Breig, Zachary, and Paul Feldman. 2024. "Revealing Risky Mistakes through Revisions." *Journal of Risk and Uncertainty* 1–28.

Burks, Stephen V., Jeffrey P. Carpenter, Lorenz Goette, and Aldo Rustichini. 2009. "Cognitive Skills Affect Economic Preferences, Strategic Behavior, and Job Attachment." *Pro-*

ceedings of the National Academy of Sciences 106 (19): 7745–7750.

Cameron, A. Colin, and Pravin K. Trivedi. 2013. *Regression Analysis of Count Data.* Vol. 53 of *Econometric Society Monographs*. 2 ed., Cambridge University Press.

Caplin, Andrew, Mark Dean, and John Leahy. 2018. "Rational Inattention, Optimal Consideration Sets, and Stochastic Choice." *The Review of Economic Studies* 86 (3): 1061–1094.

Cappelen, Alexander W, Shachar Kariv, Erik Ø Sørensen, and Bertil Tungodden. 2023. "The Development Gap in Economic Rationality of Future Elites." *Games and Economic Behavior* 142: 866–878.

Cattaneo, Matias D., Xinwei Ma, Yusufcan Masatlioglu, and Elchin Suleymanov. 2020. "A Random Attention Model." *Journal of Political Economy* 128 (7): 2796–2836.

Chetty, Raj. 2015. "Behavioral Economics and Public Policy: A Pragmatic Perspective." *American Economic Review* 105 (5): 1–33.

Choi, Syngjoo, Shachar Kariv, Wieland Müller, and Dan Silverman. 2014. "Who Is (More) Rational?" *American Economic Review* 104 (6): 1518–50.

Condon, David, and William Revelle. 2014. "The International Cognitive Ability Resource: Development and Initial Validation of a Public-Domain Measure." *Intelligence* 43: 52–64.

Cosaert, Sam, and Thomas Demuynck. 2015. "Revealed Preference Theory for Finite Choice Sets." *Economic Theory* 59 (1): 169–200.

Cowan, Nelson. 2001. "The Magical Number 4 in Short-Term Memory: A Reconsideration of Mental Storage Capacity." *Behavioral and Brain Sciences* 24 (1): 87–114.

Cowan, Nelson, Nathanael M Fristoe, Emily M Elliott, Ryan P Brunner, and J Scott Saults. 2006. "Scope of attention, control of attention, and intelligence in children and adults." *Memory & Cognition* 34: 1754–1768.

Dardanoni, Valentino, Paola Manzini, Marco Mariotti, and Christopher J. Tyson. 2020. "Inferring Cognitive Heterogeneity From Aggregate Choices." *Econometrica* 88 (3): 1269–1296.

Dean, Mark, and Daniel Martin. 2016. "Measuring Rationality with the Minimum Cost of Revealed Preference Violations." *The Review of Economics and Statistics* 98 (3): 524–534.

Dean, Mark, Özgür Kıbrıs, and Yusufcan Masatlioglu. 2017. "Limited Attention and Status Quo Bias." *Journal of Economic Theory* 169: 93–127.

DellaVigna, Stefano. 2009. "Psychology and Economics: Evidence from the Field." *Journal of Economic Literature* 47 (2): 315–72.

Echenique, Federico, Sangmok Lee, and Matthew Shum. 2011. "The Money Pump as a Measure of Revealed Preference Violations." *Journal of Political Economy* 119 (6): 1201–1223.

Echenique, Federico, Taisuke Imai, and Kota Saito. 2023. "Approximate Expected Utility Rationalization." *Journal of the European Economic Association* 21 (5): 1821–1864.

Eliaz, Kfir, and Ran Spiegler. 2011. "Consideration Sets and Competitive Marketing." *The Review of Economic Studies* 78 (1): 235–262.

Famulari, Melissa. 1995. "A household-based, nonparametric test of demand theory." *The Review of Economics and Statistics* 372–382.

Fisman, Raymond, Pamela Jakiela, Shachar Kariv, and Daniel Markovits. 2015. "The distributional preferences of an elite." *Science* 349 (6254): aab0096.

Fudenberg, Drew, Philipp Strack, and Tomasz Strzalecki. 2018. "Speed, accuracy, and the optimal timing of choices." *American Economic Review* 108 (12): 3651–3684.

Gaynor, Martin, Carol Propper, and Stephan Seiler. 2016. "Free to Choose? Reform, Choice, and Consideration Sets in the English National Health Service." *American Economic Review* 106 (11): 3521–57.

Gigerenzer, Gerd, and Peter M Todd. 1999. *Simple Heuristics That Make Us Smart.* Oxford University Press, USA.

Gilboa, Itzhak. 2010. "Questions in Decision Theory." *Annual Review of Economics* 2 (1): 1–19.

Halevy, Yoram, and Guy Mayraz. 2022. "Identifying Rule-Based Rationality." *The Review of Economics and Statistics* 1–44.

Halevy, Yoram, Dotan Persitz, and Lanny Zrill. 2018. "Parametric Recoverability of Preferences." *Journal of Political Economy* 126 (4): 1558–1593.

Harbaugh, William T., Kate Krause, and Timothy R. Berry. 2001. "GARP for Kids: On the Development of Rational Choice Behavior." *American Economic Review* 91 (5): 1539–1545.

Heitz, Richard P. 2014. "The speed-accuracy tradeoff: history, physiology, methodology, and behavior." *Frontiers in Neuroscience* 8: 86875.

Honka, Elisabeth, Ali Hortaçsu, and Maria Ana Vitorino. 2017. "Advertising, Consumer Awareness, and Choice: Evidence From the U.S. Banking Industry." *The RAND Journal of Economics* 48 (3): 611–646.

Houtman, Martijn, and Julian Maks. 1985. "Determining All Maximal Data Subsets Consistent with Revealed Preference." *Kwantitatieve Methoden* 19 (1): 89–104.

Huber, Joel, John W. Payne, and Christopher Puto. 1982. "Adding Asymmetrically Dominated Alternatives: Violations of Regularity and the Similarity Hypothesis." *Journal of Consumer Research* 9 (1): 90–98.

Johnston, W A, and V J Dark. 1986. "Selective Attention." *Annual Review of Psychology* 37 (1): 43–75.

Kahneman, Daniel. 1973. *Attention and Effort.* Vol. 1063, Englewood Cliffs, NJ: Prentice Hall.

Kahneman, Daniel. 2003. "Maps of Bounded Rationality: Psychology for Behavioral Economics." *American Economic Review* 93 (5): 1449–1475.

Kim, Hyuncheol Bryant, Syngjoo Choi, Booyuel Kim, and Cristian Pop-Eleches. 2018. "The Role of Education Interventions in Improving Economic Rationality." *Science* 362 (6410): 83–86.

Krajbich, Ian, and Antonio Rangel. 2011. "Multialternative Drift-Diffusion Model Predicts the Relationship Between Visual Fixations and Choice in Value-Based Decisions." *Proceedings of the National Academy of Sciences* 108 (33): 13852–13857.

List, John A., and Daniel L Millimet. 2008. "The Market: Catalyst for Rationality and Filter of Irrationality." *The B.E. Journal of Economic Analysis Policy* 8 (1).

Lleras, Juan Sebastián, Yusufcan Masatlioglu, Daisuke Nakajima, and Erkut Y. Ozbay. 2017. "When More Is Less: Limited Consideration." *Journal of Economic Theory* 170: 70–85.

Luce, R Duncan. 1991. *Response Times: Their Role in Inferring Elementary Mental Organization.* Oxford University Press.

Mandler, Michael, Paola Manzini, and Marco Mariotti. 2012. "A Million Answers to Twenty Questions: Choosing by Checklist." *Journal of Economic Theory* 147 (1): 71–92.

Manzini, Paola, and Marco Mariotti. 2007. "Sequentially Rationalizable Choice." *American Economic Review* 97 (5): 1824–1839.

Manzini, Paola, and Marco Mariotti. 2014. "Stochastic Choice and Consideration Sets." *Econometrica* 82 (3): 1153–1176.

Masatlioglu, Yusufcan, and Daisuke Nakajima. 2007. "A Theory of Choice by Elimination." Unpublished.

Masatlioglu, Yusufcan, Daisuke Nakajima, and Erkut Y. Ozbay. 2012. "Revealed Attention." *American Economic Review* 102 (5): 2183–2205.

Nielsen, Kirby, and John Rehbeck. 2022. "When Choices Are Mistakes." *American Economic Review* 112 (7): 2237–68.

Nisbett, Richard E., Joshua Aronson, Clancy Blair, William Dickens, James Flynn, Diane F. Halpern, and Eric Turkheimer. 2012. "Intelligence: New Findings and Theoretical Developments." *American Psychologist* 67 (2): 130.

Nishimura, Hiroki, Efe A Ok, and John K-H Quah. 2017. "A comprehensive approach to revealed preference theory." *American Economic Review* 107 (4): 1239–1263.

Oberauer, Klaus. 2019. "Working Memory and Attention–A Conceptual Analysis and Review." *Journal of Cognition* 2 (1).

Polisson, Matthew, John K-H Quah, and Ludovic Renou. 2020. "Revealed preferences over risk and uncertainty." *American Economic Review* 110 (6): 1782–1820.

Ratcliff, Roger, and Gail McKoon. 2008. "The diffusion decision model: theory and data for two-choice decision tasks." *Neural computation* 20 (4): 873–922.

Reutskaja, Elena, Rosemarie Nagel, Colin F. Camerer, and Antonio Rangel. 2011. "Search Dynamics in Consumer Choice under Time Pressure: An Eye-Tracking Study." *American Economic Review* 101 (2): 900–926.

Rönnlund, Michael, Lars Nyberg, Lars Bäckman, and Lars-Göran Nilsson. 2005. "Stability, growth, and decline in adult life span development of declarative memory: cross-sectional and longitudinal data from a population-based study." *Psychology and Aging* 20 (1): 3.

Salant, Yuval. 2011. "Procedural Analysis of Choice Rules with Applications to Bounded Rationality." *American Economic Review* 101 (2): 724–48.

Simon, Herbert A. 1955. "A Behavioral Model of Rational Choice." *The Quarterly Journal of Economics* 69 (1): 99–118.

Simon, Herbert A. 1976. "From Substantive to Procedural Rationality." In *25 Years of Economic Theoryt*. 65–86. Boston, MA: Springer US.

Sokolova, Tatiana, and Aradhna Krishna. 2016. "Take It or Leave It: How Choosing versus Rejecting Alternatives Affects Information Processing." *Journal of Consumer Research* 43 (4): 614–635.

Sternberg, Saul. 1966. "High-Speed Scanning in Human Memory." *Science* 153 (3736): 652–654.

Stroop, J. Ridley. 1935. "Studies of Interference in Serial Verbal Reactions." *Journal of Experimental Psychology* 18 (6): 643–662.

Thaler, Richard H., and Cass R. Sunstein. 2003. "Libertarian Paternalism." *American Economic Review* 93 (2): 175–179.

Tversky, Amos. 1972. "Choice by Elimination." *Journal of Mathematical Psychology* 9 (4): 341–367.

Tversky, Amos, and Itamar Simonson. 1993. "Context-Dependent Preferences." *Management Science* 39 (10): 1179–1189.

Unsworth, Nash. 2015. "Consistency of attentional control as an important cognitive trait: A latent variable analysis." *Intelligence* 49: 110–128.

Unsworth, Nash, Keisuke Fukuda, Edward Awh, and Edward K Vogel. 2014. "Working memory and fluid intelligence: Capacity, attention control, and secondary memory retrieval." *Cognitive Psychology* 71: 1–26.

Varian, Hal R. 1982. "The Nonparametric Approach to Demand Analysis." *Econometrica* 50 (4): 945–973.

Varian, Hal R. 1990. "Goodness-of-fit in optimizing models." *Journal of Econometrics* 46 (1-2): 125–140.

Yaniv, Ilan, and Yaacov Schul. 1997. "Elimination and Inclusion Procedures in Judgment." *Journal of Behavioral Decision Making* 10 (3): 211–220.

Yaniv, Ilan, and Yaacov Schul. 2000. "Acceptance and Elimination Procedures in Choice: Noncomplementarity and the Role of Implied Status quo." *Organizational Behavior and Human Decision Processes* 82 (2): 293–313.

Yu, Chi Wai, Y. Jane Zhang, and Sharon Xuejing Zuo. 2021. "Multiple Switching and Data Quality in the Multiple Price List." *The Review of Economics and Statistics* 103 (1): 136–150.

Online Appendix

Table of Contents

A Theoretical Details **1**

A.1 Proof of Proposition 1 1

A.2 Choice Consistency Respecting FSD 2

B Experimental Design Details **3**

B.1 Decision Problems 3

B.2 Experimental Instructions 4

C Sample Details **22**

C.1 Descriptive Statistics 22

C.2 Histograms 23

D Experimental Results Details **25**

D.1 Effect of Sequential Elimination 25

D.2 Procedure Preferences 30

D.3 Decision Time 33

D.4 Choice Revision 35

A Theoretical Details

A.1 Proof of Proposition 1

Let c be a choice function. Consider the following conditions:

[1] c satisfies GARP.

[2] There exists a preference relation $\succeq$ on X such that for all $A \in \mathscr{X}$, $c(A) \in \{x \in A | x \succeq y \; \forall y \in A\}$.

[3] c is a choice by sequential elimination.

By Theorem 1 of Nishimura, Ok, and Quah (2017), [1] holds if and only if [2] holds. Therefore, we will show that [3] holds if and only if [2].

[3] implies [2]. Suppose that [3] is true. Define $\gamma(A) = A$ for all $A \in \mathscr{X}$. Given c, construct an elimination function e such that for all $A \in \mathscr{X}$: if $|A| \geq 2$, then $e(A) = (e_1(A), \ldots, e_{|A|-1}(A), c(A))$ with $\bigcup_{r=1}^{|A|} \{A_r\} = A$; if $|A| = 1$, then $e_1(A) = c(A)$. For all A and $r = 1, \ldots, |A|$, we have $e_r(A) \in \gamma(A_r)$ (Definition 3 (i)); $\{x \in \gamma(A_r) | x \succeq e_r(A), x \neq e_r(A)\} \neq \emptyset$ if $|A_r| \geq 2$ (Definition 3 (ii)); and $e_{|A|}(A) = c(A)$ (Definition 3 (iii)). Thus, c is a choice by sequential elimination.

[2] implies [3]. Suppose that [2] is true. Let $\succeq$, γ, and e be the preference relation, consideration set mapping, and elimination function that satisfy the conditions in Definition 3. Suppose by contradiction that there exists some A such that $c(A) = e_{|A|} \notin \{x \in A | x \succeq y \; \forall y \in A\}$. Since $\succeq$ is complete and transitive, $\{x \in A | x \succeq y \; \forall y \in A\} \neq \emptyset$. Then there must exist some $r \in \{1, \ldots, |A-1|\}$ such that $e_r(A) \in \{x \in A | x \succeq y \; \forall y \in A\}$. Consequently, $\{x \in A_r | x \succeq e_r(A), x \neq e_r(A)\} = \emptyset$, which implies that $\{x \in \gamma(A_r) | x \succeq e_r(A), x \neq e_r(A)\} = \emptyset$, leading to a contradiction to Definition 3 (ii). Therefore, we have that for all $A \in \mathscr{X}$, $c(A) \in \{x \in A | x \succeq y \; \forall y \in A\}$.

A.2 Choice Consistency Respecting FSD

Given that the choice options in our experiment involve only two states of equal probabilities, we focus on $X \in \mathbb{R}^2_+$ and let $\mathscr{X}$ be a nonempty set of nonempty subsets of X. For any two options $x, y \in X$ defined by $x = (x_1, x_2)$ and $y = (y_1, y_2)$, we denote $x \geq_F y$ if $(x_1, x_2) \geq (y_1, y_2)$ or $(x_2, x_1) \geq (y_1, y_2)$; and $x >_F y$ if $x \geq_F y$ but the two options are distinct.

A preference relation $\succeq$ is said to be first-order stochastically monotone if $x \geq_F y$ implies $x \succeq y$ and $x >_F y$ implies $x \succeq y$ but not $y \succeq x$. For any x, y, we denote that xR^D_F (R^S_F, respectively) y if there exist some $A, B \in \mathscr{X}$ and $z \in A$ such that $c(A) = x$, $c(B) = y$, and $z \geq_F$ ($>_F$, respectively) y. We define R_F to be the transitive closure of R^D_F. The FSD-GARP criterion is formally defined as follows.

Definition 4 (FSD-GARP)**.** A choice function c is said to satisfy FSD-GARP if, for any $x, y \in X$, $xR_F y$ implies that $yR^S_F x$ does not hold.

Any first-order stochastically monotone preference relation $\succeq$ on X and any choice function c on $\mathscr{X}$ fall within the primitives of Nishimura, Ok, and Quah (2017). By applying their Theorem 1, a choice function c satisfies FSD-GARP if and only if there exists a first-order stochastically monotone preference relation $\succeq$ on X such that for all $A \in \mathscr{X}$, $c(A) \in \{x \in A | x \succeq y \; \forall y \in A\}$. Moreover, we say that an ordered pair (x, y) constitutes a violation of FSD-GARP if $xR_F y$ and $yR^S_F x$. Note that, by the same logic as in the proofs of Proposition 1 in Appendix A.1, a choice function c satisfies FSD-GARP if and only if c is a choice by sequential elimination with a first-order stochastically monotone preference relation.

B Experimental Design Details

B.1 Decision Problems

Problem	Options
1	[0, 84], [16, 76], [34, 67], [56, 56], [68, 50], [84, 42], [100, 34], [118, 25], [134, 17], [152, 8], [168, 0]
2	[0, 54], [20, 49], [44, 43], [68, 37], [88, 32], [108, 27], [132, 21], [152, 16], [172, 11], [196, 5], [216, 0]
3	[0, 225], [14, 204], [30, 180], [44, 159], [60, 135], [74, 114], [90, 90], [104, 69], [120, 45], [136, 21], [150, 0]
4	[0, 97], [18, 88], [36, 79], [50, 72], [64, 65], [92, 51], [112, 41], [134, 30], [154, 20], [176, 9], [194, 0]
5	[0, 108], [15, 96], [30, 84], [45, 72], [60, 60], [70, 52], [80, 44], [95, 32], [105, 24], [120, 12], [135, 0]
6	[0, 270], [6, 243], [12, 216], [18, 189], [24, 162], [30, 135], [36, 108], [42, 81], [48, 54], [54, 27], [60, 0]
7	[0, 150], [21, 136], [45, 120], [69, 104], [90, 90], [114, 74], [135, 60], [159, 44], [180, 30], [204, 14], [225, 0]
8	[0, 165], [17, 148], [33, 132], [50, 115], [66, 99], [83, 82], [100, 65], [116, 49], [133, 32], [149, 16], [165, 0]
9	[0, 102], [25, 92], [50, 82], [70, 74], [105, 60], [130, 50], [150, 42], [175, 32], [205, 20], [230, 10], [255, 0]
10	[0, 168], [8, 152], [17, 134], [25, 118], [34, 100], [42, 84], [50, 68], [56, 56], [67, 34], [76, 16], [84, 0]
11	[0, 216], [5, 196], [11, 172], [16, 152], [21, 132], [27, 108], [32, 88], [37, 68], [43, 44], [49, 20], [54, 0]
12	[0, 255], [10, 230], [20, 205], [32, 175], [42, 150], [50, 130], [60, 105], [74, 70], [82, 50], [92, 25], [102, 0]
13	[0, 90], [33, 79], [66, 68], [90, 60], [111, 53], [135, 45], [162, 36], [189, 27], [216, 18], [243, 9], [270, 0]
14	[0, 270], [9, 243], [18, 216], [27, 189], [36, 162], [45, 135], [53, 111], [60, 90], [68, 66], [79, 33], [90, 0]
15	[0, 60], [27, 54], [54, 48], [81, 42], [108, 36], [135, 30], [162, 24], [189, 18], [216, 12], [243, 6], [270, 0]
16	[0, 194], [9, 176], [20, 154], [30, 134], [41, 112], [51, 92], [65, 64], [72, 50], [79, 36], [88, 18], [97, 0]
17	[0, 135], [12, 120], [24, 105], [32, 95], [44, 80], [52, 70], [60, 60], [72, 45], [84, 30], [96, 15], [108, 0]
18	[0, 58], [25, 53], [45, 49], [80, 42], [115, 35], [145, 29], [175, 23], [205, 17], [230, 12], [260, 6], [290, 0]
19	[0, 290], [6, 260], [12, 230], [17, 205], [23, 175], [29, 145], [35, 115], [42, 80], [49, 45], [53, 25], [58, 0]
20	[0, 195], [20, 175], [39, 156], [59, 136], [78, 117], [96, 99], [118, 77], [137, 58], [157, 38], [176, 19], [195, 0]

B.1.1 Graphical Illustrations

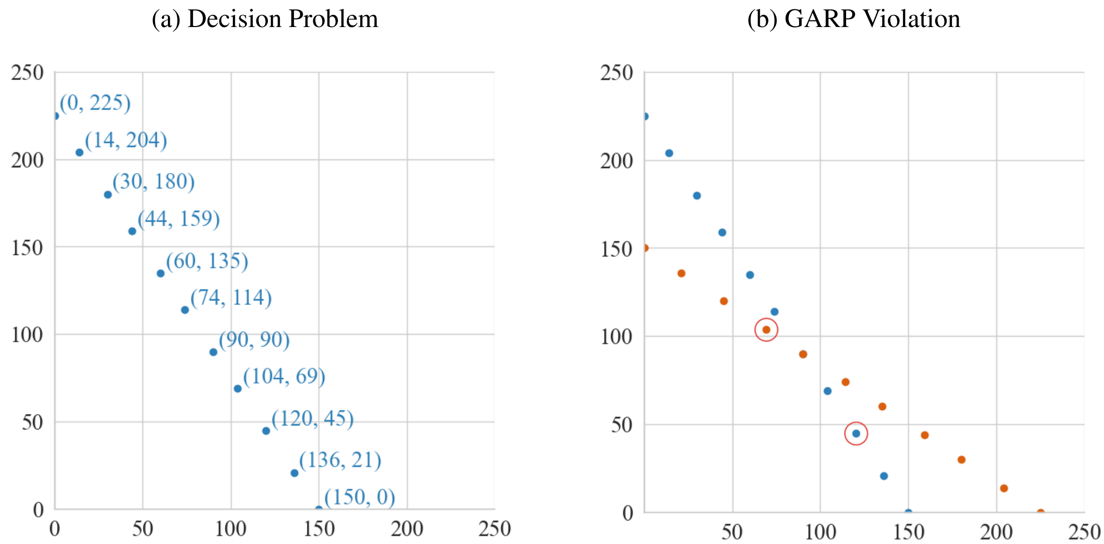


FIGURE B.1: Graphical Illustrations of Decision Problem and GARP Violation

Note: As displayed in Figure B.1(a), the blue dots represent a menu of options in the experiment. In Figure B.1(b), the red circles indicate a pair of choices that violate consistency with preference maximization.

B.2 Experimental Instructions

B.2.1 Introduction

Welcome to our study on decision-making.

The study consists of three sections. In Section 1, you will make a series of economic decisions. In Section 2, you will participate in some cognitive tasks. In Section 3, you will be asked to imagine yourself in some hypothetical scenarios and answer a few questions related to those scenarios. Detailed instructions will be provided at the beginning of each section.

You will receive £3 as a participation fee for completing the study. You will also earn an additional payment of up to £14.6 depending partly on your decisions and partly on chance. You will be paid within 3 working days after completing the study.

Please pay careful attention to the instructions. During the study, we will speak in terms of experimental tokens instead of pounds. The sum of tokens you earn in the experiment will be converted to pounds at the following rate:

25 tokens= £1

Important: Once you have moved on to the next question, you cannot go back and change your choice. Do not close the web browser at any time!

B.2.2 Experimental Section 1

Section 1 consists of two blocks, Blocks A and B. Each block consists of 21 decision problems that share a common format. An example of the decision problem will be provided at the beginning of each block.

In each decision problem, you will be asked to choose **one** option out of multiple options. An option [X, Y] indicates that you will earn either X tokens or Y tokens with **the same** probability. For instance, the option [24, 32] indicates that you will earn 24 tokens with probability 50% and 32 tokens with probability 50%.

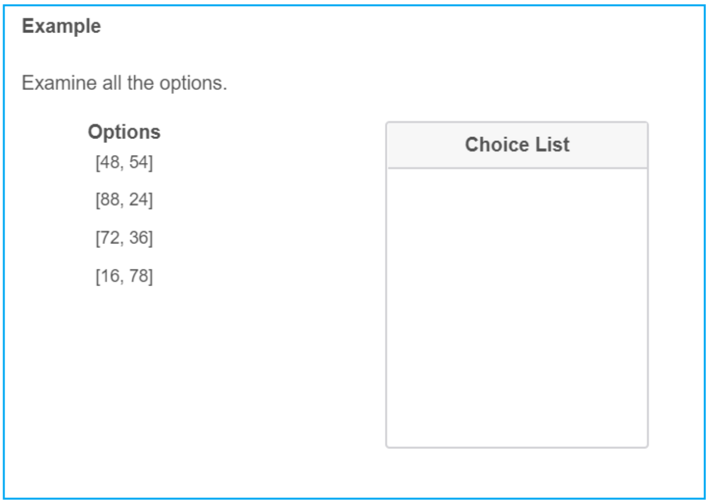
In each decision problem, you are encouraged to examine all options and should choose only one option that you prefer. There is no right and wrong answer to each decision problem. We are interested in studying your preferences.

We use the following method to determine your payment in Section 1: At the end of Section 1, you will be asked to make a choice between Blocks A and B for your payment. At the end of the experiment, one of the 21 problems from the block you choose will be drawn at random. Each problem has **the same** probability of being drawn. You will earn tokens according to your choice in this randomly drawn problem.

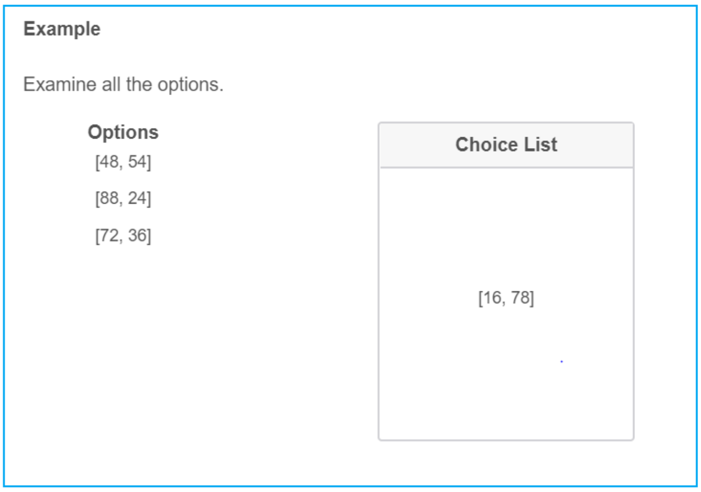
You will earn real money, depending on your decisions. Please make careful decisions.

B.2.2.1 Direct Procedure (Block A)

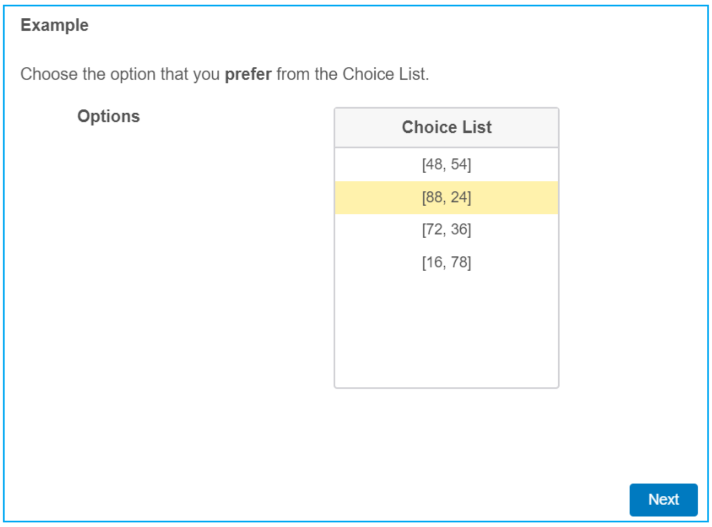
In this block, you will participate in 21 decision problems. You will make decisions by a procedure called "**sequential examination**". You will be asked to sequentially examine, one by one, options by clicking on them. Then you will be asked to choose only **one** option that you **prefer**. Below, you can see an example of sequential examination:



For instance, if you have examined the option [16, 78], you can click on it. It will then be moved to the "**Choice List**".



You should examine all the options by clicking on them. Then you can choose the option that you prefer from the "**Choice List**" by clicking on it. Your final choice will be highlighted in yellow. For instance, in the screen below, your choice is [88, 24].



You should click on "Next" to confirm your choice and proceed to the next problem.

Regarding payment, suppose that you choose [88, 24] by sequential examination. If you are paid according to this choice, you would receive 88 tokens with 50% probability and 24 tokens with 50% probability.

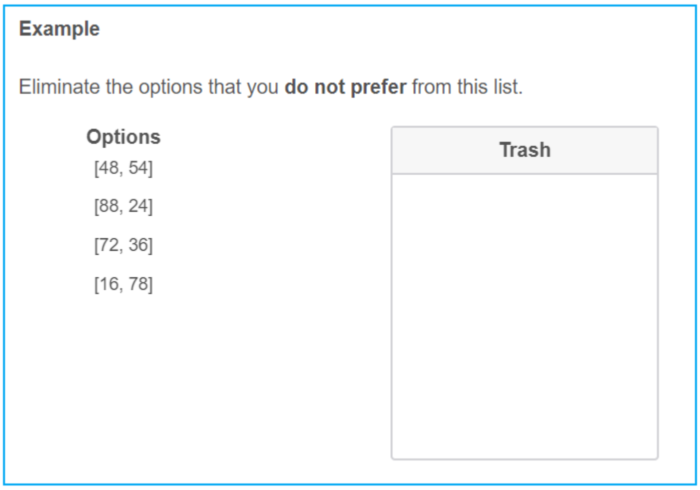
To familiarize you with the decision problems, you will have a practice problem. It will not affect your payment. Then you will be asked to complete all the problems.

Important: Once you have clicked on "**Next**", you cannot go back and change your choice.

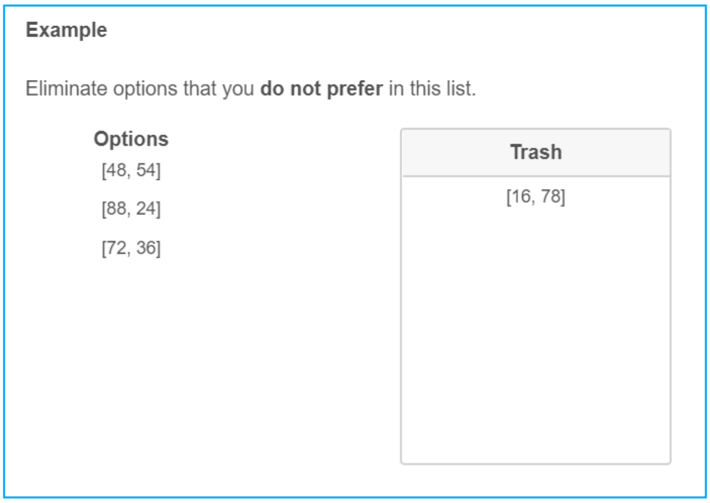
B.2.2.2 Sequential Elimination (Block A)

In this block, you will participate in 21 decision problems. You will make decisions by a procedure called "**sequential elimination**". You will be asked to sequentially eliminate, one by one, the options that you do not prefer by clicking on them, until only **one** option remains. The **last remaining option** is your **choice** in the decision problem.

Below, you can see an example of sequential elimination:

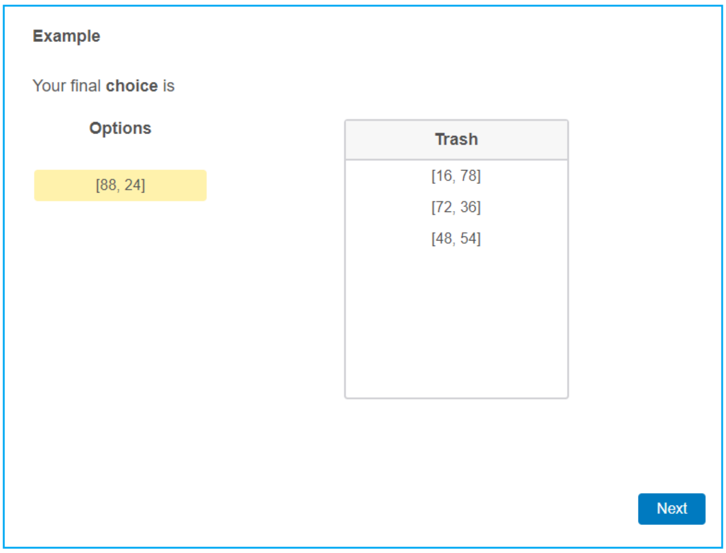


For instance, if you eliminate [16, 78] by clicking on it, it will be moved to the "**Trash**".



Note that you can **recover** the options in the Trash by clicking on them. For example, if you click on [16, 78] in the Trash, it will be moved back to the "Options".

Regarding your choice, you should eliminate options until only **one** option remains. For instance, in the screen below, suppose that you have eliminated [16, 78], [72, 36], and [48, 54]. As a result, the **last remaining** [88, 24] is your final **choice** in this problem. Your final choice is highlighted in yellow.



You should click on "Next" to confirm your choice and proceed to the next problem.

Regarding payment, suppose that you choose [88, 24] by sequential elimination. If you are paid according to this choice, you would receive 88 tokens with 50% probability and 24 tokens with 50% probability.

To familiarize you with the decision problems, you will have a practice problem. It will not affect your payment. Then you will be asked to complete all the problems.

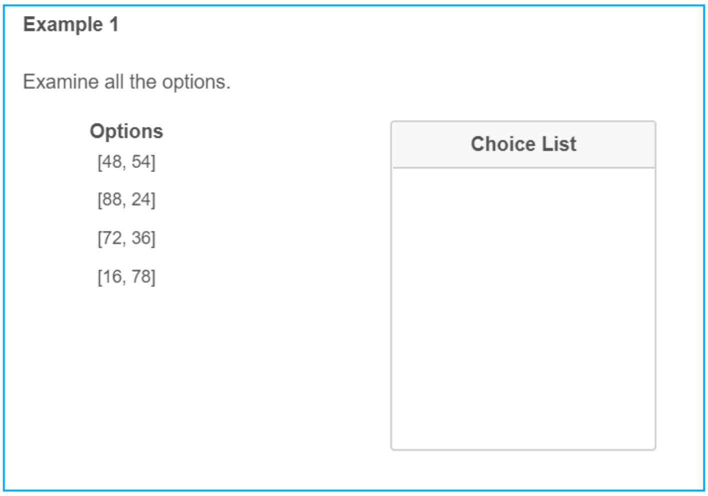
Important: Once you have clicked on "Next", you **cannot** go back and change your choice.

B.2.2.3 Procedure Preference (Block A)

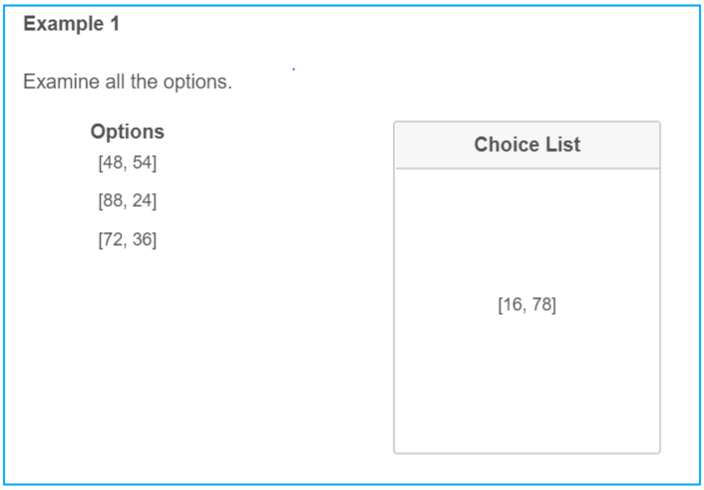
First, you have to make a choice between two choice procedures: sequential examination and sequential elimination. The two procedures will be explained below with examples. Then you will participate in 21 decision problems using the procedure chosen by you.

1) **Sequential Examination**: You will be asked to sequentially examine, one by one, options by clicking on them. Then you will be asked to choose only **one** option that you **prefer**.

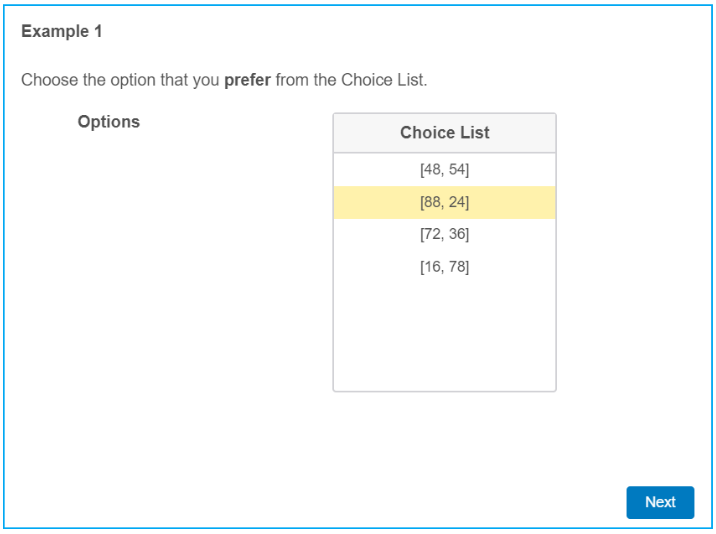
Below, you can see an example of sequential examination:



For instance, if you have examined the option [16, 78], you can click on it. It will then be moved to the "**Choice List**".



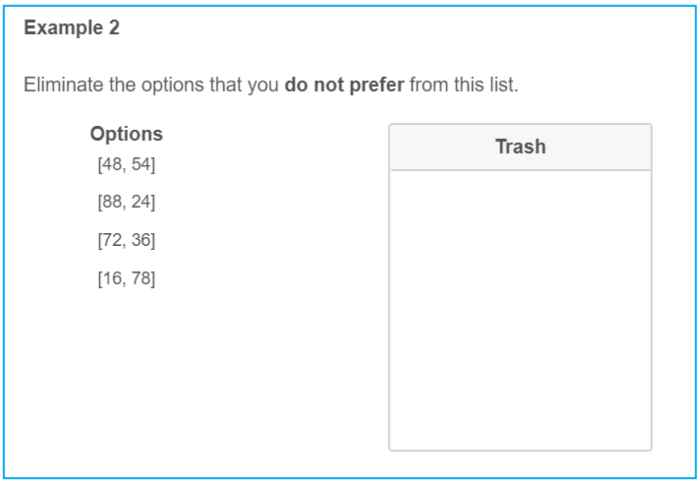
You should examine all the options by clicking on them. Then you can choose the option that you prefer in the "**Choice List**" by clicking on it. Your final choice will be highlighted in yellow. For instance, in the screen below, your choice is [88, 24].



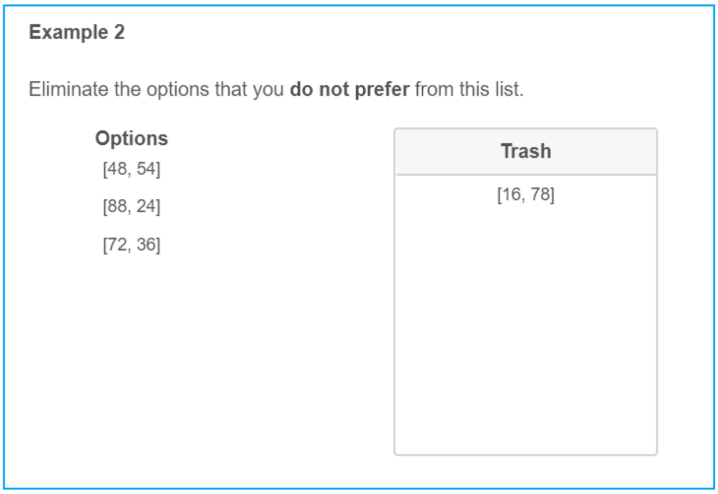
You should click on “Next” to confirm your choice and proceed to the next problem.

2) **Sequential Elimination**: You will be asked to sequentially eliminate, one by one, the options that you do **not prefer** by clicking on them, until only one option remains. The **last remaining option** is your **choice** in the decision problem.

Below, you can see an example of sequential elimination:



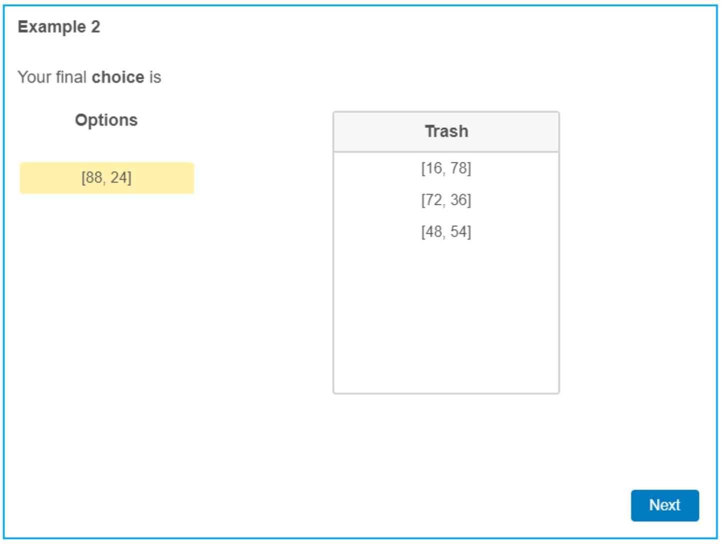
For instance, if you eliminate [16, 78] by clicking on it, it will be moved to the “**Trash**”.



Note that you can **recover** the options in the Trash by clicking on them. For example, if you click on [16, 78] in the Trash, it will be moved back to the “Options”.

Regarding your choice, you should eliminate options until only **one** option remains. For instance, in the screen below, suppose that you have eliminated [16, 78], [72, 36], and [48, 54]. As a result, the **last remaining** [88, 24] is your final choice in this problem. Your final **choice** is highlighted in yellow.

You should click on “Next” to confirm your choice and proceed to the next problem.



Regarding payment, suppose that you choose [88, 24] by sequential examination or sequential elimination. If you are paid according to this choice, you would receive 88 tokens with 50% probability and 24 tokens with 50% probability.

To familiarize you with the decision problems, you will have a practice problem for each procedure. It will not affect your payment. Then you will be asked to choose a procedure and complete all the problems.

Important: Once you have clicked on "Next", you **cannot** go back and change your choice.

B.2.2.4 Procedure Preference: Procedure Selection

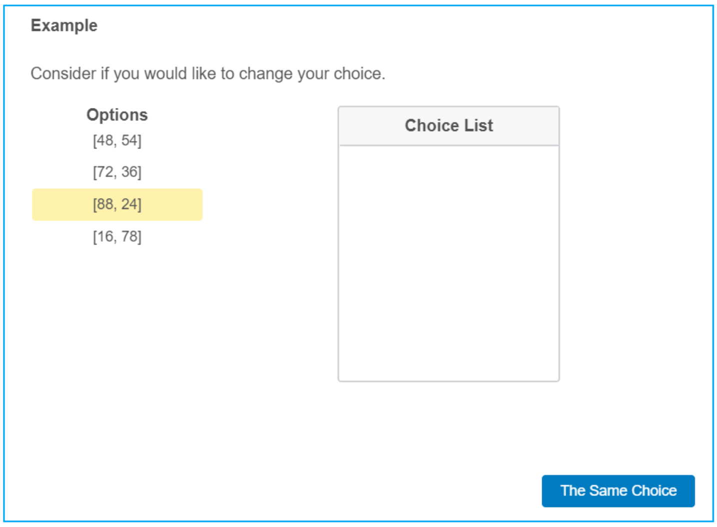
Please indicate which procedure that you would like to use in Section 1.

- The Direct Procedure
- Sequential Elimination

B.2.2.5 Direct Procedure (Block B)

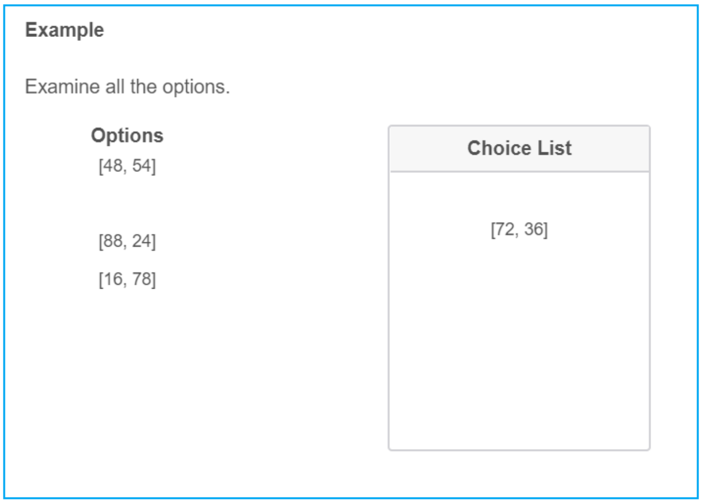
In this block, you will confront the **same** 21 decision problems as those in Block A. You will see your choice from the corresponding problem in Block A highlighted in yellow. You will be asked to consider if you would like to change your choice.

Below, you can see an example of Block B problem:



You can choose the same option as you chose in the corresponding problem in Block A by clicking on "The Same Choice". For instance, if you click on "The Same Choice" in this problem, your choice is [88, 24] and you will proceed to the next problem directly.

If you want to change your choice, you can click on **any** option on the list. Then you can start again the sequential examination. For instance, if you click on [72, 36], you will see the screen below.



Regarding payment, suppose that this time you choose [48, 54]. If you are paid according to this choice, you would receive 48 tokens with 50% probability and 54 tokens with 50% probability.

To familiarize you with the decision problems, you will have a practice problem. It will not affect your payment. Then you will be asked to complete all the problems.

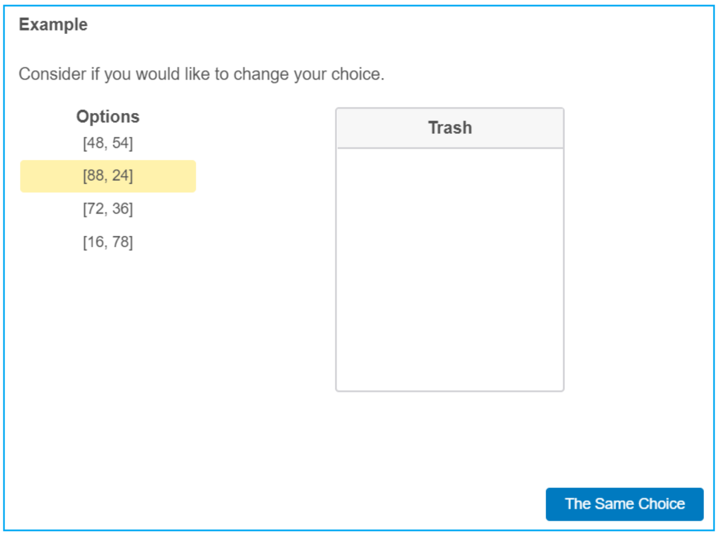
Remember that we will ask you to choose between Blocks A and B for payment at the end of Section 1.

Important: Once you have clicked on "Next", you **cannot** go back and change your choice.

B.2.2.6 Sequential Elimination (Block B)

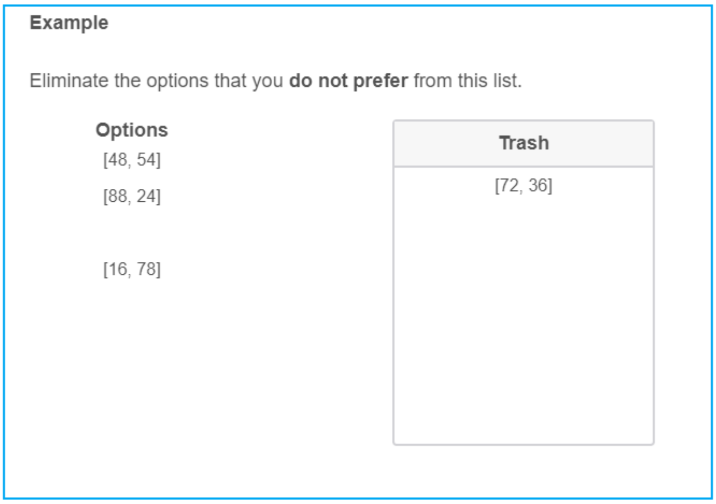
In this block, you will confront the **same** 21 decision problems as those in Block A. You will see your choice from the corresponding problem in Block A highlighted in yellow. You will be asked to consider if you would like to change your choice.

Below, you can see an example of Block B problem:



You can choose the same option as you chose in the corresponding problem in Block A by clicking on “The Same Choice”. For instance, if you click on “The Same Choice” in this problem, your choice is [88, 24] and you will proceed to the next problem directly.

If you want to change your choice, you can click on **any** option on the list. Then you can start again the sequential elimination. For instance, if you click on [72, 36], you will see the screen below.



Regarding payment, suppose that this time you choose [48, 54]. If you are paid according to this choice, you would receive 48 tokens with 50% probability and 54 tokens with 50% probability.

To familiarize you with the decision problems, you will have a practice problem. It will not affect your payment. Then you will be asked to complete all the problems.

Remember that we will ask you to choose between Blocks A and B for payment at the end of Section 1.

Important: Once you have clicked on “Next”, you **cannot** go back and change your choice.

B.2.2.7 Payment Block Selection

Please indicate that which block you would like to choose for your payment in Section 1.

- Block A
- Block B

B.2.2.8 Individual Satisfaction (Direct Procedure)

Now, we would like to understand how satisfied you are with the decisions you made in Section 1.

A rating of 0 means that you are not satisfied at all. A rating of 10 means that you cannot be more satisfied. Please select the number between 0 and 10 that best describes how you feel about the sequential examination procedure and your choices in Section 1.

B.2.2.9 Individual Satisfaction (Sequential Elimination)

Now, we would like to understand how satisfied you are with the decisions you made in Section 1.

A rating of 0 means that you are not satisfied at all. A rating of 10 means that you cannot be more satisfied. Please select the number between 0 and 10 that best describes how you feel about the sequential elimination procedure and your choices in Section 1.

(a) Direct Procedure

(b) Sequential Elimination

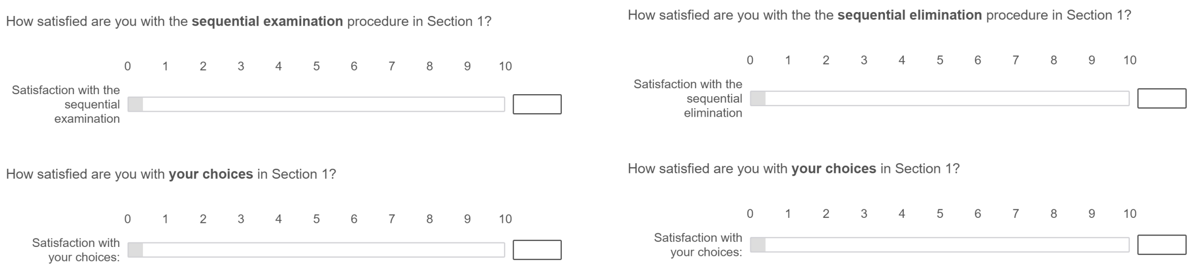
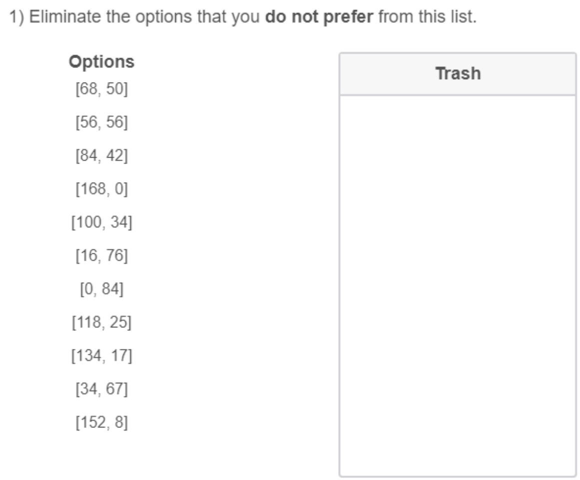


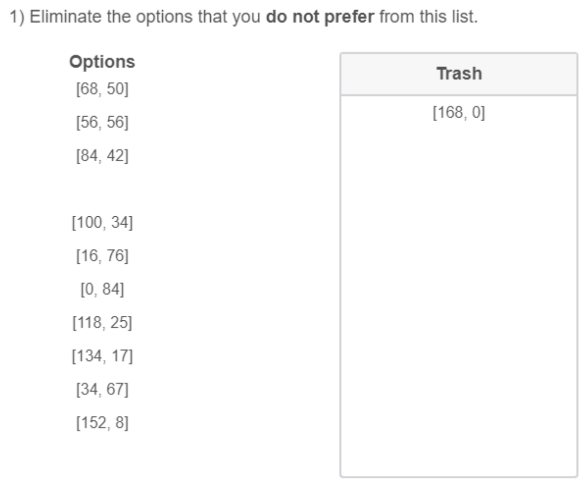
FIGURE B.2: Individual Satisfaction

B.2.2.10 Screenshots of the Treatments

(a) Initial Screen



(b) An option is eliminated



(c) Making A Choice

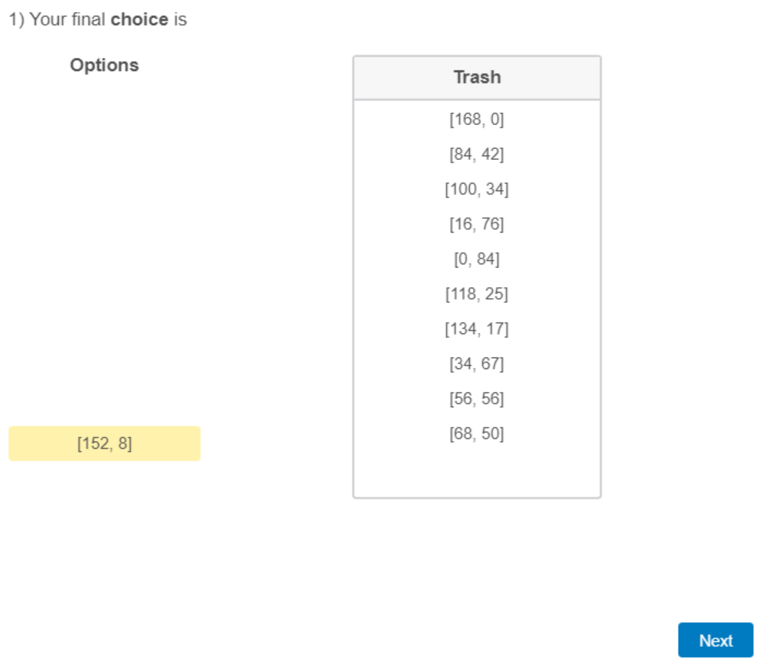
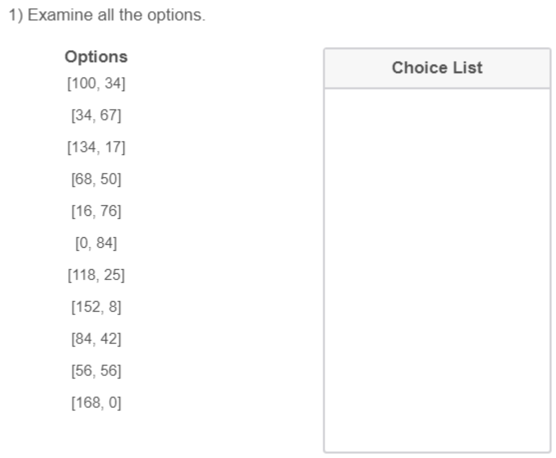
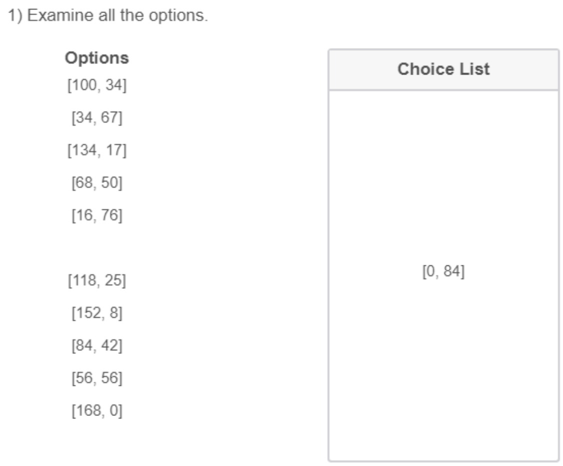


FIGURE B.3: Sequential Elimination

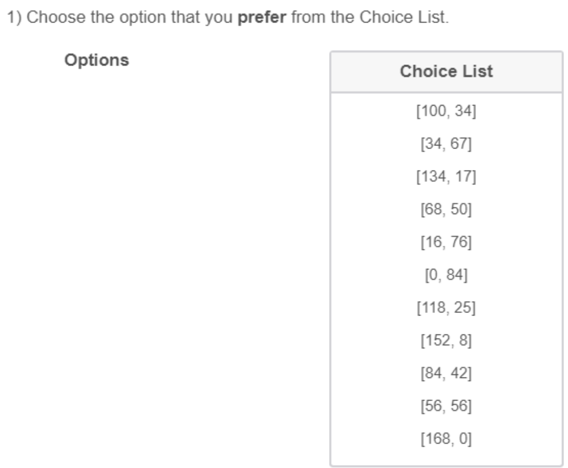
(a) Initial Screen



(b) An option is examined



(c) All options are examined



(d) Making A Choice

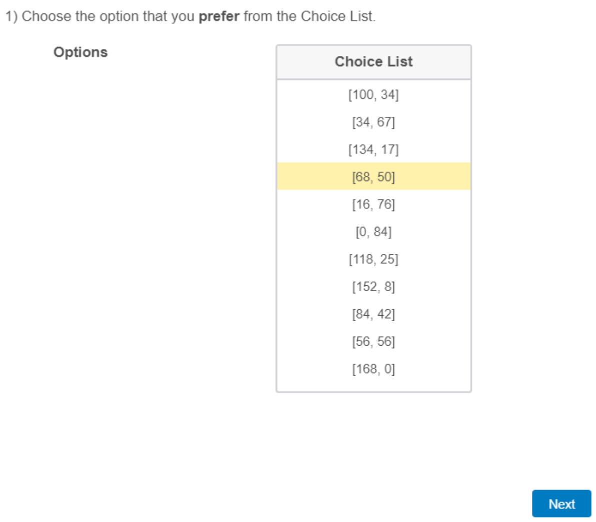


FIGURE B.4: Direct Procedure

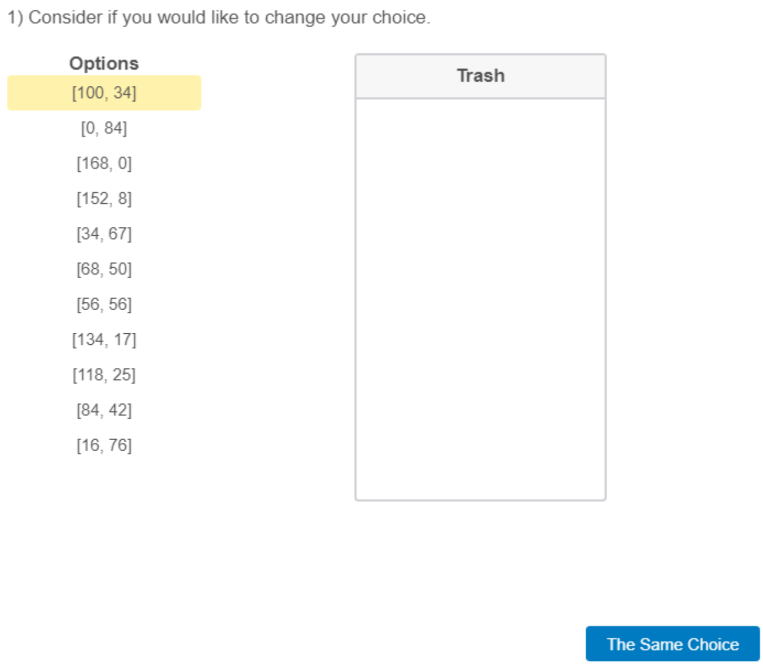
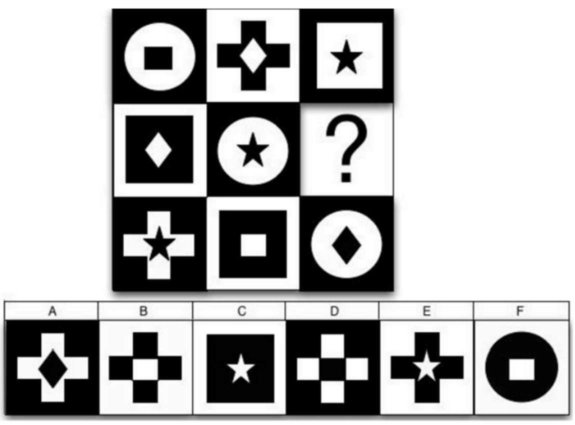


FIGURE B.5: Choice Revision

B.2.3 Experimental Section 2

This section has three cognitive tasks. Your payment in this section will depend on your performance in the three tasks. Each task has a different number of questions. At the end of the experiment, the computer will randomly draw three questions from all the tasks with equal probability. For each correct answer to the random three questions, you will receive 25 tokens.

(a) Matrix Reasoning Problem



(b) Three-Dimensional Rotation Problem

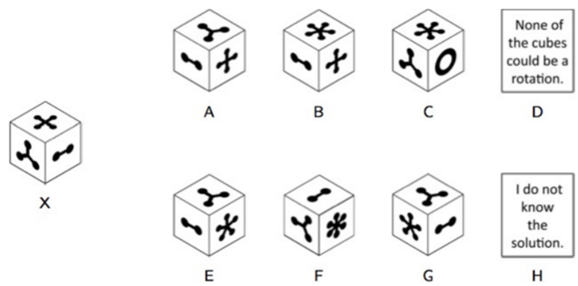


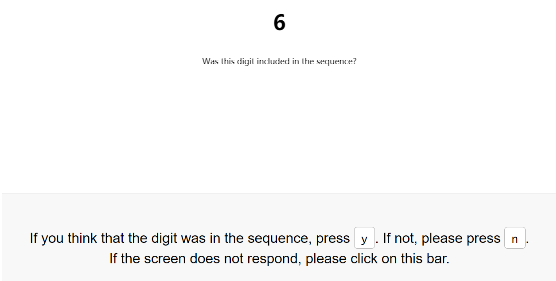
FIGURE B.6: ICAR Test

(a) Stroop Test

(b) Sternberg Test (Memorization)

(c) Sternberg Test (Recall 1)

(d) Sternberg Test (Recall 2)



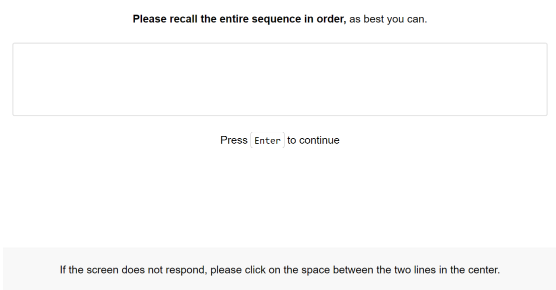


FIGURE B.7: Cognitive Function Tests

B.2.4 Experimental Section 3

In this section, you will also be asked to imagine yourself in three hypothetical scenarios and answer a few questions related to those scenarios. There are no right or wrong answers to those questions, simply answer based on your feelings.

B.2.4.1 Question 1 (Attitude toward Inconsistency)

Imagine that you are at a cinema and wish to buy some popcorn. The cinema sells small tubs of popcorn for £3 and large ones for £7. Suppose that you choose the small one. Now consider a different situation. The cinema sells small tubs for £3, medium ones for £6.50, and large ones for £7. This time you choose the large one.

In the first case, you prefer the small size to the large. In the second case, your choice suggests the opposite. How at ease do you feel with your choices? Please rate how at ease you feel on the scale provided. A rating of 0 means that you are not at all at ease with one or more of your choices and would really like to make changes. A rating of 10 means that you could not be more at ease and have no wish to change anything.

B.2.4.2 Question 2 (Sunk Cost Fallacy)

Imagine that you have spent £50 on a ticket for concert A and £100 on a ticket for concert B. You really prefer A to B, but you have discovered that the two concerts are to take place exactly at the same time on the same day. You cannot obtain a refund or sell the tickets. Which concert would you go to?

- Concert A
- Concert B

B.2.4.3 Question 3 (Non-Consequentialism)

Imagine two trips you may make this summer. You plan Trip 1 by yourself. Someone plans Trip 2 for you. The plans for both trips are the same. You will visit the same places, take the same photos, and enjoy the same foods. In other words, you will enjoy the same experiences on both trips. Which trip do you prefer to go to?

- Trip 1
- Trip 2
- I am indifferent between the two trips.

C Sample Details

C.1 Descriptive Statistics

TABLE C.1: Sample Descriptive Statistics

Variable	Sequential Elimination (SE) Mean	Direct Procedure (DP) Mean	Procedure Preference (PP) Mean	SE vs. DP	SE vs. PP	PP vs. DP
Age	24.712	23.147	23.360	1.566	1.352	0.213
	(0.967)	(0.587)	(0.726)	(1.131)	(1.209)	(0.933)
Female	0.507	0.520	0.480	-0.013	0.027	-0.040
	(0.059)	(0.058)	(0.058)	(0.083)	(0.083)	(0.082)
Education	2.603	2.453	2.240	0.149	0.363	-0.213
	(0.184)	(0.186)	(0.175)	(0.262)	(0.254)	(0.255)
Attitude toward Inconsistency	5.329	5.800	5.240	-0.471	0.089	-0.560
	(0.341)	(0.335)	(0.289)	(0.478)	(0.447)	(0.442)
IQ	4.562	4.907	4.747	-0.345	-0.185	-0.160
	(0.3)	(0.265)	(0.296)	(0.4)	(0.421)	(0.397)
Selective Attention	16.616	17.173	17.680	-0.557	-1.064	0.507
	(0.491)	(0.394)	(0.357)	(0.629)	(0.607)	(0.531)
Working Memory	6.096	6.213	6.547	-0.117	-0.451	0.333
	(0.273)	(0.25)	(0.28)	(0.37)	(0.391)	(0.375)
Decision Time (All Subjects)	11.217	7.474	8.86	3.743	2.357	1.386
	(0.945)	(0.402)	(0.622)	(1.026)	(1.131)	(0.741)
Decision Time (Low-IQ Subjects)	11.867	7.777	7.888	4.09	3.979	0.111
	(1.599)	(0.713)	(0.561)	(1.751)	(1.695)	(0.907)
Decision Time (High-IQ Subjects)	10.430	7.224	9.914	3.206	0.516	2.691
	(0.792)	(0.443)	(1.129)	(0.907)	(1.379)	(1.213)
Observations	73	75	75	148	148	150

Note: The variable *education* represents the highest level of education attained and is assigned a numeric value defined as follows: 1="High school diploma/A-levels" or "Secondary education (e.g., GED/GCSE)", 2="Technical/community college", 3="Undergraduate degree (BA/BSc/other)", 4="Graduate degree (MA/MSc/MPhil/other)", 5="Doctorate degree (PhD/other)". Decision times are in minutes. Standard errors are in parentheses.

TABLE C.2: Breakdown of Observations

	Sequential Elimination (SE)	Direct Procedure (DP)	Procedure Preference (PP)	SE Selected in PP	DP Selected in PP
Low-IQ	40 (55%)	34 (45%)	39 (52%)	32 (65%)	7 (27%)
High-IQ	33 (45%)	41 (55%)	36 (48%)	17 (35%)	19 (73%)
Total	73 (100%)	75 (100%)	75 (100%)	49 (100%)	26 (100%)

Note: The table presents the number of observations by treatment and IQ group. Percentages of subjects in each IQ group within each treatment are shown in parentheses.

C.2 Histograms

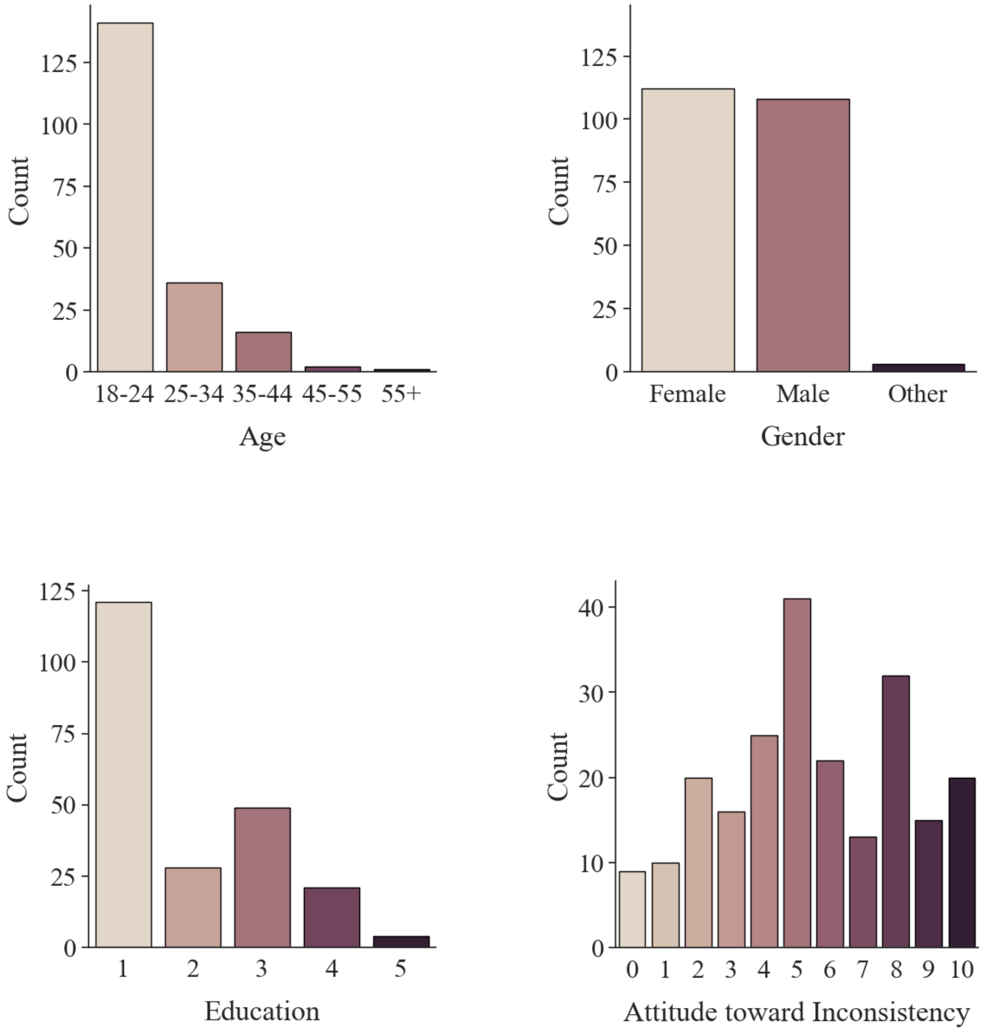


FIGURE C.1: Histograms of Individual Characteristics

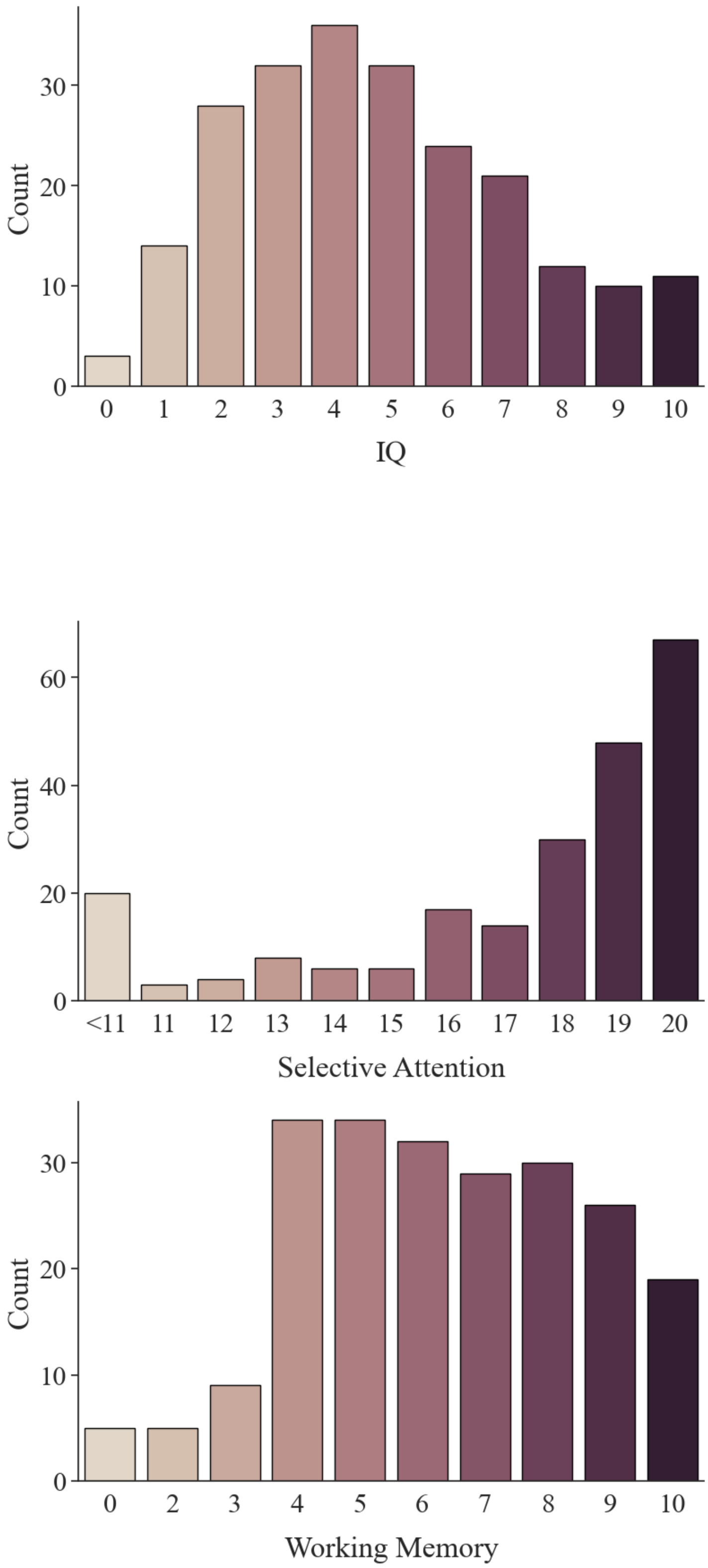


FIGURE C.2: Histograms of Cognitive Ability

D Experimental Results Details

D.1 Effect of Sequential Elimination

TABLE D.1: Economic Rationality by IQ Groups under Direct Procedure

	Overall	Low-IQ	High-IQ	Low-IQ vs. High-IQ	
	Mean	Mean	Mean	Mean Difference	*p*-value
	(1)	(2)	(3)	(4)	(5)
Consistency	0.560	0.412	0.683	-0.271	0.034
	(0.058)	(0.086)	(0.074)	(0.113)	
FSD-Consistency	0.347	0.265	0.415	-0.150	0.265
	(0.055)	(0.077)	(0.078)	(0.109)	
GARP Violations	5.800	9.735	2.537	7.199	0.005
	(1.369)	(2.602)	(1.059)	(2.81)	
FSD-GARP Violations	28.187	36.765	21.073	15.692	0.015
	(5.701)	(8.619)	(7.508)	(11.43)	
HMI	0.640	0.941	0.390	0.551	0.008
	(0.098)	(0.169)	(0.098)	(0.195)	
FSD-HMI	1.560	1.912	1.268	0.643	0.033
	(0.22)	(0.323)	(0.296)	(0.438)	
Observations	75	34	41		

Note: The table compares economic rationality between low-IQ and high-IQ subjects in the Direct Procedure. Column 1 shows the overall mean values. Columns 2 and 3 detail group-specific mean values. Column 4 presents the differences between these mean values. Column 5 provides p-values derived from chi-square tests for consistency and FSD-consistency, as well as Mann–Whitney U tests for other measures. Standard errors are shown in parentheses.

TABLE D.2: Comparison of FSD-Consistency and Consistency among IQ Groups

	FSD-Consistency vs. Consistency					
	Overall		Sequential Elimination		Direct Procedure	
	Mean Diff.	*p*-value	Mean Diff.	*p*-value	Mean Diff.	*p*-value
	(1)	(2)	(3)	(4)	(5)	(6)
Low-IQ Subjects	-0.176	< 0.001	-0.200	0.005	-0.147	0.025
	(0.081)		(0.110)		(0.115)	
High-IQ Subjects	-0.216	< 0.001	-0.152	0.025	-0.268	0.001
	(0.080)		(0.123)		(0.107)	
All Subjects	-0.196	< 0.001	-0.178	< 0.001	-0.213	< 0.001
	(0.057)		(0.081)		(0.080)	

Note: The table compares FSD-consistency against consistency across different groups. The odd-numbered columns display the mean differences, while the even-numbered columns present p-values from the paired samples Wilcoxon test for differences in distributions. Standard errors are shown in parentheses.

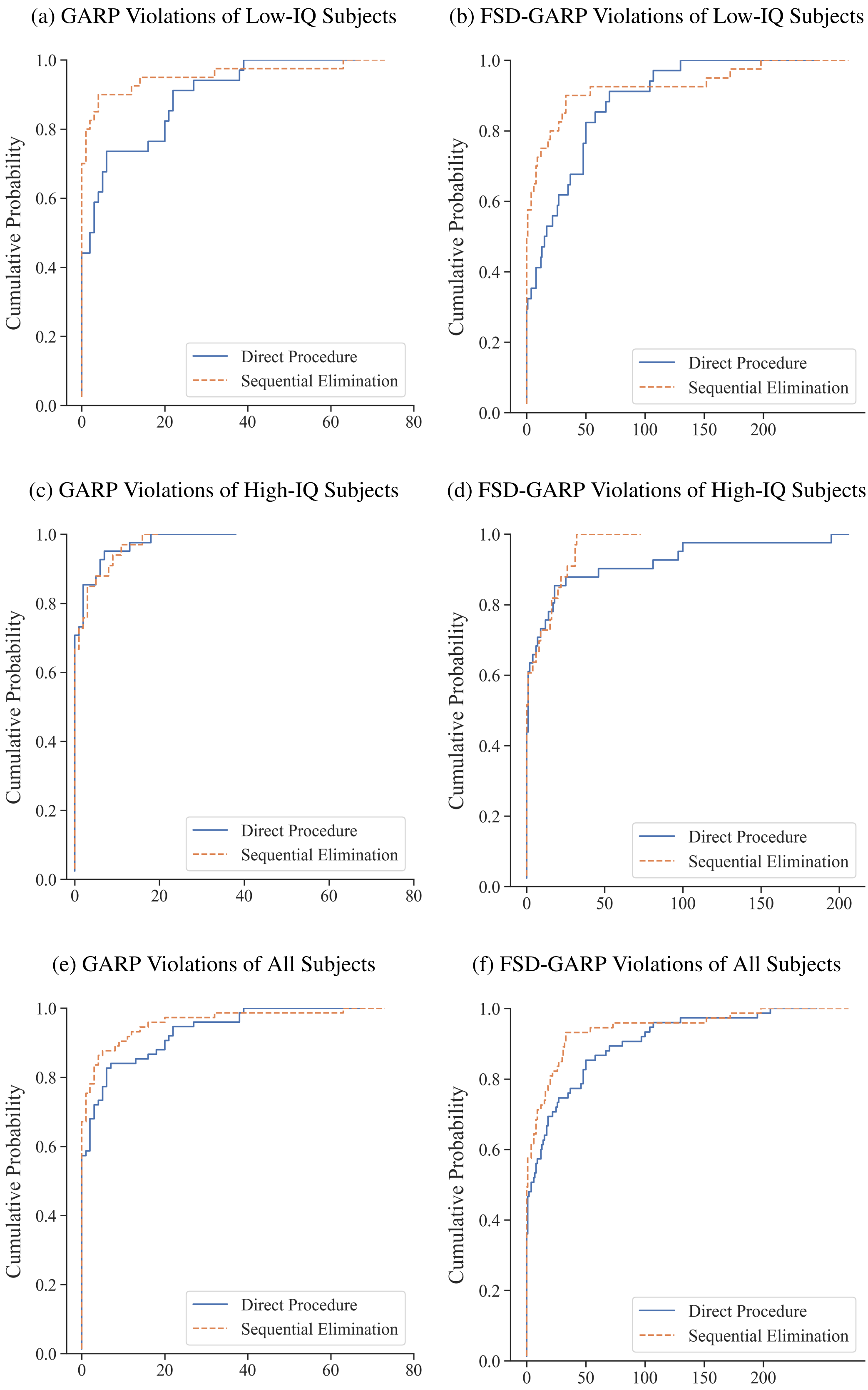


FIGURE D.1: Empirical cumulative distributions of GARP and FSD-GARP violations across the Direct Procedure and Sequential Elimination treatments for low-IQ, high-IQ, and all subjects.

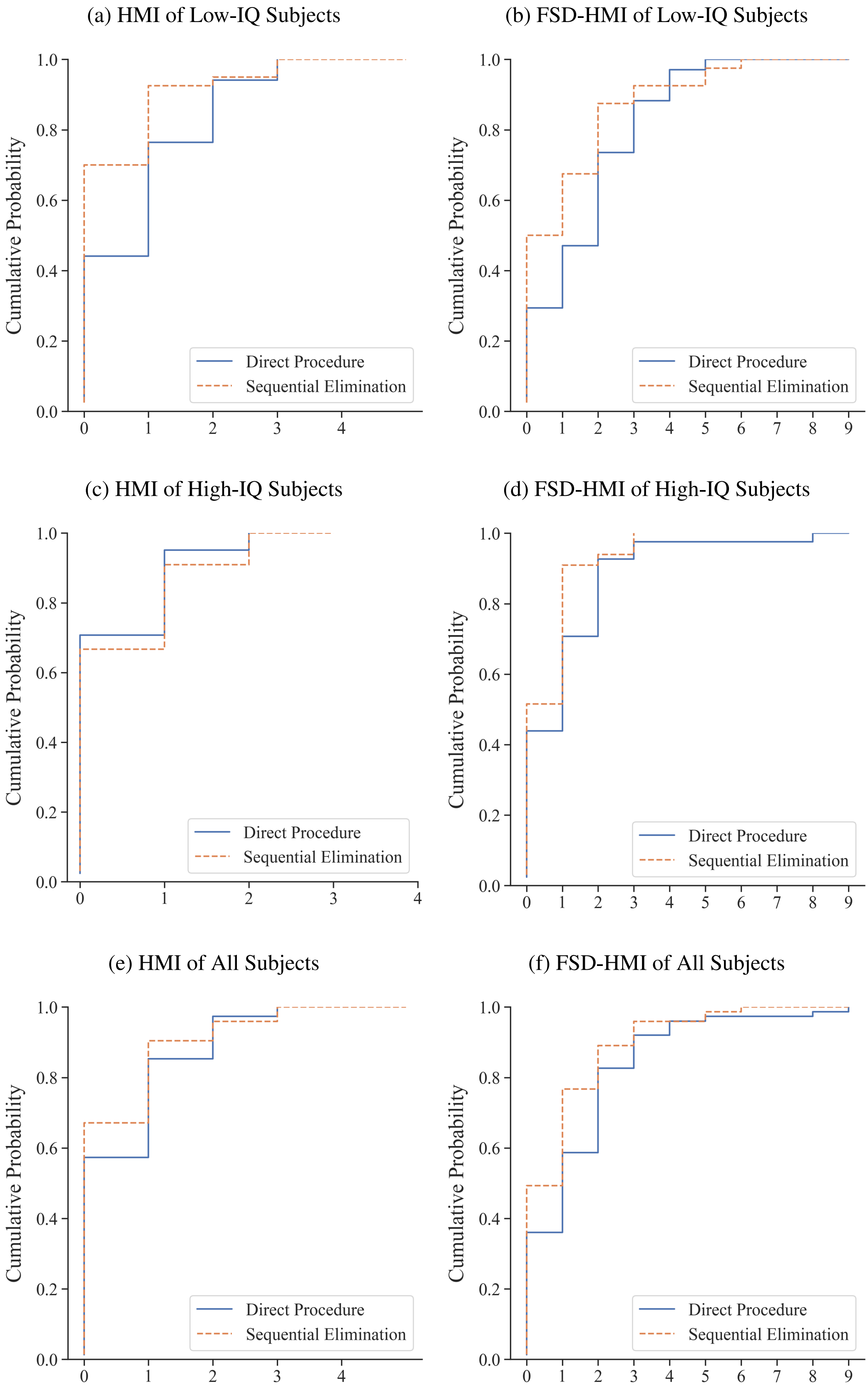


FIGURE D.2: Empirical cumulative distributions of the HMI and FSD-HMI across the Direct Procedure and Sequential Elimination treatments for low-IQ, High-IQ, and all subjects.

TABLE D.3: Effect of Sequential Elimination by Tercile-IQ Groups

	Consistency (1)	FSD-Consistency (2)	GARP Violations (3)	FSD-GARP Violations (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Sequential Elimination	1.309*	0.492	-1.713***	-0.674	-0.777*	-0.227
	(0.685)	(0.673)	(0.659)	(0.595)	(0.411)	(0.316)
2nd-Tercile-IQ	0.230	-1.296*	-0.287	1.017**	-0.180	0.548*
	(0.645)	(0.767)	(0.539)	(0.470)	(0.336)	(0.307)
3rd-Tercile-IQ	1.838**	0.780	-2.461***	-1.565**	-1.263**	-0.758**
	(0.728)	(0.655)	(0.703)	(0.643)	(0.508)	(0.354)
Sequential Elimination	-0.994	1.283	1.398*	-0.947	0.934*	-0.665
× 2nd-Tercile-IQ	(0.902)	(0.967)	(0.819)	(0.768)	(0.529)	(0.465)
Sequential Elimination	-2.058**	-0.808	2.604***	1.035	1.436**	0.255
× 3rd-Tercile-IQ	(0.955)	(0.891)	(0.946)	(0.867)	(0.657)	(0.478)
Panel B: Marginal Effects of Sequential Elimination						
1st-Tercile-IQ Subjects	0.291**	0.111	-9.894*	-15.244	-0.471*	-0.303
	(0.145)	(0.150)	(5.549)	(14.384)	(0.257)	(0.424)
2nd-Tercile-IQ Subjectss	0.073	0.331***	-2.447	-68.925**	0.124	-1.524**
	(0.139)	(0.119)	(4.252)	(32.181)	(0.285)	(0.637)
3rd-Tercile-IQ Subjectss	-0.136	-0.073	1.481	2.828	0.230	0.020
	(0.119)	(0.137)	(1.218)	(5.115)	(0.179)	(0.261)
All Subjects	0.071	-3.544	-27.053**	-0.041	-0.619**	
	(0.079)	(2.600)	(12.442)	(0.144)	(0.276)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha			1.640***	1.456***	-2.097	-0.653**
			(0.163)	(0.132)	(1.276)	(0.305)
Log Likelihood	-88.098	-87.591	-284.008	-480.472	-139.121	-217.500
Observations	148	148	148	148	148	148

Note: This table estimates the effect of sequential elimination on economic rationality among subjects categorized by IQ score terciles. Columns 1 and 2 present logistic regression results for consistency and FSD-consistency. Columns 3 to 6 display negative binomial regression results for GARP and FSD-GARP violations, as well as the HMI and FSD-HMI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different groups, indicating the average change in the dependent variables upon switching from the Direct Procedure to Sequential Elimination across observations. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE D.4: Effect of Sequential Elimination by Quartile-IQ Groups

	Consistency (1)	FSD-Consistency (2)	GARP Violations (3)	FSD-GARP Violations (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Sequential Elimination	1.300*	0.479	-1.576**	-0.464	-0.779*	-0.227
	(0.679)	(0.669)	(0.633)	(0.579)	(0.409)	(0.317)
2nd-Quartile-IQ	0.123	-1.260	0.270	1.314**	-0.054	0.538
	(0.750)	(0.947)	(0.585)	(0.591)	(0.379)	(0.356)
3rd-Quartile-IQ	0.745	-0.535	-1.228**	0.346	-0.528	0.262
	(0.671)	(0.715)	(0.548)	(0.487)	(0.378)	(0.362)
4th-Quartile-IQ	1.972**	0.920	-2.920***	-2.193***	-1.518**	-0.839*
	(0.851)	(0.720)	(0.765)	(0.633)	(0.617)	(0.432)
Sequential Elimination	-0.770	1.408	1.112	-1.137	0.871	-0.573
× 2nd-Quartile-IQ	(1.065)	(1.146)	(0.946)	(0.957)	(0.646)	(0.563)
Sequential Elimination	-1.327	0.524	1.409*	-1.087	1.076*	-0.629
× 3rd-Quartile-IQ	(0.946)	(0.939)	(0.826)	(0.761)	(0.556)	(0.485)
Sequential Elimination	-2.218**	-1.052	3.006***	1.743*	1.550**	0.326
× 4th-Quartile-IQ	(1.080)	(0.994)	(1.099)	(0.928)	(0.762)	(0.567)
Panel B: Marginal Effects of Sequential Elimination						
1st-Quartile-IQ Subjects	0.290**	0.108	-8.849*	-10.481	-0.476*	-0.304
	(0.144)	(0.149)	(4.669)	(13.083)	(0.255)	(0.426)
2nd-Quartile-IQ Subjectss	0.123	0.361**	-5.427	-83.913	0.081	-1.414*
	(0.190)	(0.155)	(8.782)	(58.261)	(0.445)	(0.856)
3rd-Quartile-IQ Subjectss	-0.006	0.213	-0.503	-31.453**	0.180	-1.121*
	(0.153)	(0.141)	(1.792)	(15.821)	(0.256)	(0.583)
4th-Quartile-IQ Subjectss	-0.164	-0.132	1.914	8.171	0.224	0.068
	(0.143)	(0.168)	(1.457)	(5.934)	(0.175)	(0.319)
All Subjects	0.073	0.123	-3.384	-24.447**	-0.046	-0.633**
	(0.079)	(0.079)	(2.490)	(12.428)	(0.141)	(0.273)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha			1.599***	1.449***	-2.360	-0.565*
			(0.167)	(0.129)	(1.596)	(0.310)
Log Likelihood	-89.131	-89.035	-282.593	-480.055	-139.031	-220.020
Observations	148	148	148	148	148	148

Note: This table estimates the effect of sequential elimination on economic rationality among subjects categorized by IQ score quantiles. Columns 1 and 2 present logistic regression results for consistency and FSD-consistency. Columns 3 to 6 display negative binomial regression results for GARP and FSD-GARP violations, as well as the HMI and FSD-HMI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different groups, indicating the average change in the dependent variables upon switching from the Direct Procedure to Sequential Elimination across observations. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

D.2 Procedure Preferences

TABLE D.5: Determinants of Individual Preference for Sequential Elimination (High-IQ Specifications)

	Selecting Sequential Elimination		
	(1)	(2)	(3)
High-IQ	-1.312**	-1.175**	-1.060*
	(0.588)	(0.596)	(0.628)
Selective Attention	-0.107	-0.111	-0.130
	(0.095)	(0.106)	(0.102)
Working Memory	-0.210*	-0.231**	-0.239*
	(0.112)	(0.116)	(0.134)
Education		0.533*	0.627**
		(0.298)	(0.278)
Age			-0.032
			(0.044)
Female			0.668
			(0.585)
Attitude toward Inconsistency			0.038
			(0.123)
Log Likelihood	-41.147	-39.338	-38.468
Observations	75	75	75

Note: This table examines the determinants of individual preference for Sequential Elimination using logistic regressions on the probability of selecting it in the Procedure Preference treatment. The dependent variable is binary, with 1 indicating a choice for Sequential Elimination and 0 otherwise. All models include a constant term. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE D.6: Impacts of Procedure Preference on GARP and FSD-GARP Violations

	Sequential Elimination Selected vs. Assigned		Direct Procedure Selected vs. Assigned		Procedure Preference vs. Direct Procedure	
	GARP Violations (1)	FSD-GARP Violations (2)	GARP Violations (3)	FSD-GARP Violations (4)	GARP Violations (5)	FSD-GARP Violations (6)
Panel A: Regression Coefficients						
Procedure Preference	0.032	0.116	-0.744	-0.770	-0.811*	-0.999**
	(0.568)	(0.516)	(0.732)	(0.757)	(0.473)	(0.405)
High-IQ	-0.051	-0.262	-1.722***	-0.710	-1.799***	-0.709
	(0.511)	(0.484)	(0.442)	(0.464)	(0.454)	(0.456)
Procedure Preference	-0.393	-0.401	1.543*	0.742	1.555**	0.738
× High-IQ	(0.834)	(0.741)	(0.864)	(0.840)	(0.726)	(0.652)
Panel B: Marginal Effects of Procedure Preference						
Low-IQ Subjects	0.165	2.697	-7.428	-22.517	-8.040	-27.203**
	(2.912)	(12.356)	(6.983)	(20.122)	(5.330)	(12.921)
High-IQ Subjects	-1.447	-4.189	3.094	-0.584	2.648	-4.861
	(2.264)	(7.896)	(2.552)	(10.032)	(2.276)	(9.296)
All Subjects	-0.212	0.955	-0.972	-9.062	-3.044	-16.474**
	(2.306)	(9.472)	(3.180)	(10.389)	(3.104)	(7.958)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha	1.838***	1.659***	1.546***	1.551***	1.791***	1.644***
	(0.194)	(0.149)	(0.190)	(0.158)	(0.160)	(0.130)
Log Likelihood	-200.212	-342.126	-226.096	-355.541	-311.973	-489.760
Observations	122	122	101	101	150	150

Note: The table presents negative binomial regression results for the impacts of procedure preference on economic rationality, based on the number of GARP and FSD-GARP violations. The first two columns compare the economic rationality of subjects who select Sequential Elimination in the Procedure Preference treatment with those assigned to it. The middle two columns perform a similar analysis for subjects who select the Direct Procedure against those assigned to it. The last two columns compare the Procedure Preference treatment with the Direct Procedure treatment. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Procedure Preference for different groups, indicating the average change in the dependent variables upon switching from the assigned procedures to the selected ones. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE D.7: Impacts of Procedure Preference on the HMI and FSD-HMI

	Sequential Elimination Selected vs. Assigned		Direct Procedure Selected vs. Assigned		Procedure Preference vs. Direct Procedure	
	HMI (1)	FSD-HMI (2)	HMI (3)	FSD-HMI (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Procedure Preference	-0.048	0.117	-0.502	-0.693	-0.491	-0.413*
	(0.416)	(0.294)	(0.547)	(0.478)	(0.316)	(0.243)
High-IQ	0.115	-0.353	-0.922***	-0.527*	-0.845***	-0.430
	(0.355)	(0.275)	(0.324)	(0.286)	(0.326)	(0.284)
Procedure Preference	0.177	0.080	1.344**	0.660	1.154***	0.276
× High-IQ	(0.602)	(0.501)	(0.653)	(0.609)	(0.442)	(0.402)
Panel B: Marginal Effects of Procedure Preference						
Low-IQ Subjects	-0.025	0.148	-0.371	-1.003*	-0.352	-0.637*
	(0.215)	(0.376)	(0.348)	(0.568)	(0.222)	(0.385)
High-IQ Subjects	0.082	0.182	0.495*	-0.039	0.366*	-0.156
	(0.277)	(0.403)	(0.255)	(0.436)	(0.188)	(0.367)
All Subjects	0.010	0.159	0.143	-0.422	-0.008	-0.405
	(0.168)	(0.286)	(0.207)	(0.341)	(0.150)	(0.266)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha	-0.579	-0.530	-13.925***	-0.529	-1.249*	-0.360
	(0.679)	(0.370)	(2.322)	(0.409)	(0.724)	(0.301)
Log Likelihood	-111.430	-163.848	-103.103	-160.652	-152.130	-231.040
Observations	122	122	101	101	150	150

Note: The table presents negative binomial regression results for the impacts of procedure preference on economic rationality, based on the HMI and FSD-HMI. The first two columns compare the economic rationality of subjects who select Sequential Elimination in the Procedure Preference treatment with those assigned to it. The middle two columns perform a similar analysis for subjects who select the Direct Procedure against those assigned to it. The last two columns compare the Procedure Preference treatment with the Direct Procedure treatment. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Procedure Preference for different groups, indicating the average change in the dependent variables upon switching from the assigned procedures to the selected ones. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

D.3 Decision Time

TABLE D.8: Overall Impact of Decision Time on Economic Rationality

	Consistency (1)	FSD-Consistency (2)	GARP Violations (3)	FSD-GARP Violations (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Decision Time	0.206	-0.069	-0.456**	0.059	-0.223*	0.011
	(0.174)	(0.164)	(0.178)	(0.144)	(0.119)	(0.109)
Sequential Elimination	0.362	0.605	-0.326	-0.884**	-0.111	-0.513**
	(0.369)	(0.374)	(0.393)	(0.350)	(0.234)	(0.211)
IQ	0.390*	0.320	-0.552***	-0.441**	-0.270**	-0.291***
	(0.202)	(0.206)	(0.204)	(0.180)	(0.119)	(0.095)
Selective Attention	0.063	0.230	-0.100	-0.255	-0.070	-0.125
	(0.198)	(0.251)	(0.188)	(0.181)	(0.122)	(0.108)
Working Memory	0.141	0.047	-0.113	-0.148	-0.250	-0.138
	(0.202)	(0.186)	(0.182)	(0.161)	(0.155)	(0.119)
Age	0.342	0.439**	-0.500*	-0.361	-0.364**	-0.246**
	(0.211)	(0.204)	(0.257)	(0.249)	(0.160)	(0.117)
Female	0.574	0.216	0.141	-0.314	-0.184	-0.098
	(0.360)	(0.362)	(0.374)	(0.324)	(0.232)	(0.197)
Education	0.020	0.011	-0.042	0.158	0.048	0.076
	(0.193)	(0.194)	(0.225)	(0.213)	(0.130)	(0.112)
Attitude toward Inconsistency	0.138	-0.011	-0.355**	-0.275*	-0.143	-0.027
	(0.183)	(0.167)	(0.174)	(0.166)	(0.118)	(0.095)
Panel B: Marginal Effects						
Decision Time	0.044	-0.015	-2.375**	1.577	-0.132*	0.015
	(0.037)	(0.036)	(1.184)	(3.930)	(0.073)	(0.146)
Sequential Elimination	0.078	0.132	-1.660	-23.172*	-0.065	-0.676**
	(0.080)	(0.081)	(1.964)	(11.973)	(0.136)	(0.301)
IQ	0.084**	0.069	-2.870**	-11.836**	-0.159**	-0.389***
	(0.042)	(0.043)	(1.376)	(5.769)	(0.072)	(0.133)
Selective Attention	0.014	0.050	-0.518	-6.840	-0.041	-0.168
	(0.043)	(0.053)	(1.003)	(5.639)	(0.072)	(0.150)
Working Memory	0.030	0.010	-0.587	-3.970	-0.148	-0.184
	(0.043)	(0.040)	(0.973)	(4.623)	(0.096)	(0.163)
Age	0.074*	0.095**	-2.601*	-9.666	-0.214**	-0.329**
	(0.045)	(0.042)	(1.463)	(7.052)	(0.100)	(0.159)
Female	0.124	0.047	0.732	-8.425	-0.109	-0.131
	(0.076)	(0.078)	(1.964)	(8.982)	(0.135)	(0.261)
Education	0.004	0.002	-0.220	4.228	0.028	0.102
	(0.042)	(0.042)	(1.173)	(6.052)	(0.077)	(0.153)
Attitude toward Inconsistency	0.030	-0.002	-1.849*	-7.362	-0.084	-0.036
	(0.039)	(0.036)	(1.092)	(5.265)	(0.072)	(0.127)
Log Alpha			1.735***	1.554***	-1.489*	-0.461
			(0.162)	(0.129)	(0.834)	(0.331)
Log Likelihood	-91.683	-91.774	-287.767	-486.384	-143.047	-223.063
Observations	148	148	148	148	148	148

Note: This table estimates the overall impact of decision time on economic rationality. All non-binary independent variables are standardized to have a mean of zero and a variance of one. Columns 1 and 2 present logistic regression results for consistency and FSD-consistency. Columns 3 to 6 display negative binomial regression results for the number of GARP and FSD-GARP violations, as well as the HMI and FSD-HMI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of each independent variable. All models include a constant term. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE D.9: Impact of Decision Time on Economic Rationality in Choice Procedures

	Consistency (1)	FSD-Consistency (2)	GARP Violations (3)	FSD-GARP Violations (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Decision Time	0.389	-0.070	0.003	-0.439	-0.208	-0.274
	(0.533)	(0.559)	(0.443)	(0.429)	(0.266)	(0.229)
Sequential Elimination	0.988*	1.013*	-1.182**	-1.078**	-0.431	-0.445*
	(0.537)	(0.554)	(0.516)	(0.486)	(0.325)	(0.265)
High-IQ	1.148**	0.793	-1.990***	-0.828*	-0.795**	-0.467
	(0.566)	(0.586)	(0.505)	(0.483)	(0.363)	(0.335)
Decision Time × Sequential Elimination	-0.196	-0.158	-0.623	0.574	-0.062	0.367
	(0.593)	(0.605)	(0.496)	(0.465)	(0.322)	(0.262)
Decision Time × High-IQ	-0.086	0.643	-0.909	0.398	-0.089	-0.274
	(0.893)	(0.920)	(0.781)	(0.652)	(0.587)	(0.639)
Sequential Elimination × High-IQ	-1.236	-0.963	1.296*	0.234	0.727	0.044
	(0.771)	(0.771)	(0.731)	(0.702)	(0.512)	(0.446)
Decision Time × Sequential Elimination	-0.316	-0.346	1.827*	-0.655	0.461	0.180
× High-IQ	(1.033)	(1.059)	(0.995)	(0.883)	(0.679)	(0.699)
Panel B: Marginal Effects of Decision Time						
Sequential Elimination Subjects	-0.003	-0.017	-1.301	0.863	-0.054	0.058
	(0.052)	(0.060)	(1.031)	(2.715)	(0.089)	(0.111)
Sequential Elimination and Low-IQ	0.041	-0.052	-2.947*	2.473	-0.151	0.108
	(0.045)	(0.047)	(1.703)	(3.033)	(0.109)	(0.129)
Sequential Elimination and High-IQ	-0.045	0.016	0.696	-1.171	0.054	-0.000
	(0.092)	(0.106)	(1.555)	(4.890)	(0.146)	(0.176)
Direct Procedure Subjects	0.073	0.059	-0.927	-13.540	-0.149	-0.569
	(0.088)	(0.092)	(3.242)	(16.220)	(0.151)	(0.380)
Direct Procedure and Low-IQ	0.087	-0.013	0.047	-24.047	-0.178	-0.492
	(0.113)	(0.104)	(6.048)	(28.263)	(0.220)	(0.432)
Direct Procedure and High-IQ	0.060	0.125	-2.153	-0.921	-0.116	-0.657
	(0.135)	(0.142)	(1.896)	(10.163)	(0.204)	(0.708)
Low-IQ Subjects	0.064	-0.032	-1.286	-11.724	-0.164	-0.212
	(0.062)	(0.057)	(3.035)	(15.921)	(0.129)	(0.252)
High-IQ Subjects	0.010	0.073	-0.812	-1.031	-0.034	-0.371
	(0.087)	(0.092)	(1.618)	(5.526)	(0.140)	(0.426)
All Subjects	0.038	0.024	-1.147	-6.306	-0.106	-0.288
	(0.055)	(0.056)	(1.658)	(8.702)	(0.094)	(0.241)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha			1.653***	1.549***	-1.706*	-0.496
			(0.162)	(0.127)	(0.985)	(0.316)
Log Likelihood	-90.554	-91.734	-284.654	-486.039	-141.847	-222.753

Note: This table estimates the impact of decision time on economic rationality, interacting with choice procedures. All non-binary independent variables are standardized to have a mean of zero and a variance of one. Columns 1 and 2 present logistic regression results for consistency and FSD-consistency. Columns 3 to 6 display negative binomial regression results for the number of GARP and FSD-GARP violations, as well as the HMI and FSD-HMI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of decision time for different groups. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), and attitude toward inconsistency. Robust standard errors are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

D.4 Choice Revision

TABLE D.10: Effect of Choice Revision on Economic Rationality

	Consistency (1)	FSD-Consistency (2)	GARP Violations (3)	FSD-GARP Violations (4)	HMI (5)	FSD-HMI (6)
Panel A: Regression Coefficients						
Revision	-0.309	-0.690	-1.020***	-0.799***	-0.101	-0.104
	(0.547)	(0.517)	(0.366)	(0.263)	(0.268)	(0.179)
Sequential Elimination	1.378**	1.647**	-1.758**	-1.793***	-0.810*	-0.740**
	(0.693)	(0.759)	(0.750)	(0.636)	(0.458)	(0.357)
High-IQ	1.027	0.596	-2.052***	-0.620	-1.004**	-0.129
	(0.681)	(0.749)	(0.604)	(0.582)	(0.421)	(0.358)
Revision × Sequential Elimination	-0.255	0.462	0.985**	0.763*	0.240	-0.061
	(0.660)	(0.587)	(0.502)	(0.403)	(0.392)	(0.216)
Revision × High-IQ	0.436	1.146*	1.041*	0.182	0.175	-0.451*
	(0.707)	(0.622)	(0.598)	(0.355)	(0.437)	(0.270)
Sequential Elimination× High-IQ	-1.806*	-1.080	1.688**	0.612	1.377**	0.145
	(0.931)	(0.970)	(0.844)	(0.800)	(0.637)	(0.517)
Revision× Sequential Elimination	0.465	-0.515	-1.520**	-0.890	-0.752	0.083
× High-IQ	(0.879)	(0.828)	(0.757)	(0.604)	(0.568)	(0.380)
Panel B: Marginal Effects of Revision by Groups						
Sequential Elimination Subjects	-0.015	0.025	-0.603	-3.422	-0.078	-0.263
	(0.081)	(0.096)	(1.540)	(4.574)	(0.138)	(0.170)
Sequential Elimination and Low-IQ	0.024	0.101	0.077	-20.105	0.029	-0.718*
	(0.105)	(0.097)	(1.820)	(13.823)	(0.151)	(0.400)
Sequential Elimination and High-IQ	0.072	0.091	-1.302	-7.037	-0.235	-0.384*
	(0.090)	(0.119)	(0.870)	(4.952)	(0.162)	(0.214)
Direct Procedure Subjects	-0.020	0.006	-10.565	-33.613	-0.037	-0.458
	(0.086)	(0.069)	(9.938)	(20.627)	(0.163)	(0.285)
Direct Procedure and Low-IQ	-0.070	-0.104	-17.323	-44.628	-0.099	-0.189
	(0.123)	(0.078)	(14.139)	(30.142)	(0.265)	(0.334)
Direct Procedure and High-IQ	-0.107	-0.050	-0.159	-0.475	0.068	-0.139
	(0.101)	(0.107)	(2.235)	(6.011)	(0.172)	(0.193)
Low-IQ Subjects	-0.088	-0.077	-8.992	-23.046	-0.016	-0.165
	(0.090)	(0.074)	(7.839)	(16.526)	(0.177)	(0.225)
High-IQ Subjects	0.047	0.096	-0.592	-13.718*	-0.102	-0.557**
	(0.079)	(0.084)	(1.050)	(8.131)	(0.121)	(0.250)
All Subjects	-0.020	0.017	-5.727	-18.462	-0.045	-0.372*
	(0.070)	(0.068)	(5.811)	(11.532)	(0.122)	(0.198)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha			1.791***	1.611***	-0.904	-0.452
			(0.182)	(0.146)	(0.670)	(0.343)
Log Likelihood	-108.521	-109.498	-326.669	-558.191	-175.650	-256.149
Observations	184	184	184	184	184	184

Note: This table estimates the effect of choice revision for subjects under Direct Procedure and Sequential Elimination treatments, comparing economic rationality before and after revisions. Columns 1 and 2 present logistic regression results for consistency and FSD-consistency. Columns 3 to 6 display negative binomial regression results for the number of GARP and FSD-GARP violations, as well as the HMI and FSD-HMI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of choice revision for different groups, indicating the average change in the dependent variables upon switching from initial to revised choices across observations. All models include a constant term. Control variables encompass cognitive functions (selective attention and working memory), demographics (age, gender, and education), attitude toward inconsistency, and decision time. Robust standard errors clustered at the individual level are shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.