Economic Rationality under Limited Attention: The Effect of Sequential Elimination

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Abstract

Evidence suggests that limited attention to all available options often leads individuals to deviate from preference maximization. We address this issue by proposing a framework that incorporates choice procedures where individuals consider at least two available options. We show that choices made under *sequential elimination* (where individuals eliminate options sequentially until only one survives) always maximize preferences, whereas choices made directly from menus do not. Using a randomized controlled experiment, we find causal evidence that sequential elimination significantly improves individual consistency with preference maximization among subjects with low cognitive ability. Furthermore, when given a choice between procedures, these individuals predominantly select sequential elimination, revealing economic rationality akin to that of their counterparts directly assigned to the procedure.

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

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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). Moreover, this issue is prevalent in markets with overwhelming 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)—thereby posing a substantial welfare challenge to economists and policymakers. Despite this wealth of research, a salient gap persists in the literature concerning the improvement of economic rationality in decision-making.

We present the first study demonstrating how a simple *choice procedure* can systematically ameliorate individual inconsistency with preference maximization under limited attention. Building upon 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 facilitates a rigorous comparison of individual consistency across two notable yet distinct choice procedures. The first is the *direct procedure*, in which the DM chooses directly from menus. In this procedure, limited attention may cause individual inconsistency due to the DM overlooking the best options on menus. This leads us to investigate *sequential elimination*, where the DM eliminates options sequentially 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 two strands of empirical evidence: both *sequential* (Besedeš et al., 2015) and *elimination-based* (e.g., Sokolova and Kr-

[1] In this paper, standard preferences are defined as complete, transitive, and monotone. See Section 2 for formal details.

ishna, 2016) procedures have been shown to 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 this literature through a choice-theoretic examination of sequential elimination that provides testable implications.

We identify a key property, herein referred to as the *minimum attention* property, which is necessary and sufficient for individual consistency with preference maximization in 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 of the result is that in every elimination round, one of the best options in a menu survives—either through being overlooked or by beating the other considered options. Consequently, sequential elimination decomposes a taxing preference maximization problem into a sequence of manageable elimination subproblems. Based on the theoretical results, we formulate our hypothesis: sequential elimination, as compared with the direct procedure, reveals a higher level of consistency in the choices of individuals with limited attention.

To test the hypothesis, we conduct an experiment guided by the framework. The experiment gauges individual consistency through twenty decision problems involving risk, adapted from Kim et al. (2018). Each problem comprises eleven distinct, randomly ordered options, where each represents a lottery rewarding one of two monetary amounts with equal probability. Given the simplicity of each option, the primary challenge of this setup arguably lies in considering all available options across the decision problems. In other words, the experiment closely emulates decision-making in real-world scenarios marked by limited attention, thereby allowing for a cautious interpretation of treatment differences with respect to this cognitive limitation.

In the main experiment, subjects are randomly assigned to either the *Direct Procedure* or *Sequential Elimination* treatments, which implement the corresponding choice procedures with meticulously controlled instructions and user interfaces.[3] We evalu-

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

[3] See Section 3.2 for details of the experimental treatments. Throughout this paper, where initially

ate individual consistency by the Generalized Axiom of Revealed Preference (GARP), a necessary and sufficient condition for choices to be consistent with preference maximization (Afriat, 1967; Varian, 1982, 1983). Specifically, we utilize two measures based on GARP to probe treatment differences in economic rationality: a binary metric for full consistency with preference maximization (i.e., absence of GARP violations) and a discrete metric quantifying the degree of deviations from preference maximization (i.e., the number of GARP violations).

Considering the implication that limited attention is more prevalent among individuals with lower cognitive abilities, 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) as a suitable proxy for individuals with limited attention. To obtain a more accurate estimation of sequential elimination's effect, we incorporate additional cognitive functions, including selective attention and working memory capacity, along with demographics and individual attitudes toward inconsistency. To further examine the validity of the framework, we extend the analysis of sequential elimination's effect to subjects with varying cognitive abilities.

Our central experimental results indicate that Sequential Elimination significantly raises the proportion of low-IQ subjects making fully consistent choices by 25.8 percentage points ($se = 0.111$) as compared with the Direct Procedure. This improvement represents an increase of over 61.7% in their estimated rate of full consistency when using the Direct Procedure. Similarly, Sequential Elimination substantially reduces their number of GARP violations by 10.710 ($se = 5.550$). This reduction exceeds 70% of their estimated number of violations under the Direct Procedure. Furthermore, the improvement attributed to Sequential Elimination among low-IQ subjects remains significant across various measures of individual consistency, including Strong Axiom of Revealed Preference (SARP) violations (Rose, 1958) and Houtman–Maks (HM) index (Houtman and Maks, 1985), and to a lesser extent, critical cost efficiency index (CCEI,

capitalized, the terms Direct Procedure and Sequential Elimination refer to the respective experimental treatments; otherwise, they indicate their respective general meanings.

Afriat, 1972).[4] Collectively, the results offer causal evidence in support of our hypothesis.

While a negligible difference is observed between the two treatments in the consistency of *high-IQ* subjects (i.e., those with above-median IQ scores), these individuals generally make highly consistent choices. In contrast, subjects with IQ scores in the lowest tercile and quartile exhibit a significant improvement in economic rationality as a result of Sequential Elimination, with GARP violations decreased by approximately 81.7% and 78.6%, respectively. These results suggest a more pronounced effect of sequential elimination on individuals more susceptible to limited attention. The effect on GARP violations persists among all subjects, with a significant reduction of nearly 60.8% compared to the estimated values under the Direct Procedure. Additionally, Sequential Elimination leads to a noteworthy drop in the number of first-order stochastic dominance (FOSD) violations, typically indicative of mistakes but not necessarily individual consistency (e.g., Quiggin, 1990; Wakker, 1993; Choi et al., 2014).[5] Importantly, these findings reinforce the evidence for sequential elimination's role in improving economic rationality.

Understanding whether using sequential elimination aligns with individual preferences is crucial for enhancing its real-world applications. To this end, we implement a third treatment, referred to as *Procedure Preference*, where subjects choose between the Direct Procedure and Sequential Elimination, subsequently making decisions using their preferred procedures. Our findings reveal a stronger 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.

Our analysis indicates no significant difference in the level of economic rationality between subjects selecting Sequential Elimination under the Procedure Preference treatment and those directly assigned to it. Similarly, the Procedure Preference treatment improves individual consistency as compared with the Direct Procedure, with an effect

[4] Further elaboration on these measures is included in Section 3.2.

[5] A FOSD violation occurs when an individual opts against an option offering better outcomes without any additional risk than his choice.

approaching that attributable to Sequential Elimination in both magnitude and statistical significance. These consistent findings suggest that providing sequential elimination as an optional procedure could yield appreciable benefits to cognitively disadvantaged individuals who preferentially adopt it.

This study makes two additional contributions to the literature. First, we investigate the impact of choice procedures on the elicitation of risk preferences. Our findings suggest an overall negative correlation between cognitive ability and risk aversion within the experiment. This is in line with the main findings of existing research (see, e.g., Dohmen et al., 2018, for reviews); meanwhile, other studies point out that this may stem from choice errors (e.g., Andersson et al., 2016). Our further analysis attributes this correlation predominantly to Sequential Elimination. Considering the established literature and our central results, our preferred interpretation is that sequential elimination aids in the elicitation of risk preferences by mitigating errors caused by limited attention. This sheds light on the relationship between cognitive ability and risk preferences by underscoring the role of choice procedures, thus bridging these strands of literature.

Second, our experiment enriches the emerging literature on choice procedures through an examination of their impact grounded in the classical GARP axiom. Recent studies have shown that conformity with relatively straightforward normative axioms (such as FOSD) can be enhanced by *choice revision*, an alternative procedure, which gives individuals a chance to revise choices (e.g., Benjamin, Fontana, and Kimball, 2020; Breig and Feldman, 2020; Nielsen and Rehbeck, 2022). Still, the robustness of this effect remains to be established in settings where limited attention looms. We incorporate a choice revision mechanism into our experimental design; yet, the data reveal its impact on individual consistency to be nonsignificant. This serves as corroborative evidence for the nontrivial role of sequential elimination in mitigating the impact of limited attention in decision-making.

The findings of this study offer practical implications for policymakers. First and foremost, sequential elimination is distinguished by its intuitive nature and arguably low implementation cost. These characteristics render it economically viable, especially for individuals with cognitive 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 across various domains is critically underpinned by the minimum attention property, which is descriptively compelling. Furthermore, the procedure features a high degree of implementation flexibility; for example, policymakers could provide it as a public good and encourage its voluntary adoption by individuals. Finally, the paper illuminates the potential of incorporating choice procedures to understand individual preferences, which are of fundamental importance to 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 individual consistency 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 individual inconsistency via the menu-dependence of sets of comparable alternatives (and the corresponding eliminations). Our framework diverges by upholding menu-independent comparisons and instead establishing a descriptively appealing structure for individual 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 processes by intrinsic 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 indicates 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 subjects consider more options in judgment tasks when employing elimination strategies than when making inclusion-based or direct 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 individual 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 US and the Netherlands, respectively, reveal lower levels of economic rationality among socioeconomically disadvantaged and older households. 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 economic rationality is 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 critical 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 abilities. 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 within a controlled experiment, 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 with which we derive our hypothesis. Section 3 details the experimental design. Section 4 presents the experimental results. Section 5 discusses the broader implications of these findings, and Section 6 offers concluding remarks.

2 Framework

Let $x \in \mathbb{R}^k_+$ be an option representing a bundle of k goods. Consider a finite data set $D = \{c^i, M^i\}_{i=1}^n$, where M^i is a finite menu of distinct options and a DM chooses c^i from M^i. Let $X = \cup_{i=1}^n M^i$ be the set of all available options and $\mathscr{X}$ be the set of all nonempty subsets of X. Let $\succeq$ be a complete, transitive, and monotone preference relation over X.[6]

In this paper, we assume that the DM has limited attention. Specifically, when faced with a menu M, the DM pays attention to a limited set of options on the menu, $\gamma(M)$, 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 M comprises multiple options. Formally, a *consideration set mapping* γ assigns to every $M \in \mathscr{X}$ a subset of M such that $|\gamma(M)| \geq \min\{|M|, 2\}$. A consideration set mapping is said to be a *full consideration* if for all $M \in \mathscr{X}$, $\gamma(M) = M$.

2.1 Direct Procedure

In the direct procedure, the DM chooses an alternative 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. The data set $D = \{c^i, M^i\}_{i=1}^n$ is *generated by the direct procedure* if there exist a preference relation $\succeq$ and a consideration set mapping γ such that for all i, $c^i \in \{x \in \gamma(M^i) | x \succeq y \ \forall y \in \gamma(M^i)\}$. Further, D is generated by the direct procedure with full consideration if γ is a full consideration.

We assess the DM's economic rationality by GARP, a necessary and sufficient condition for a data set D to be rationalized by a preference relation. A GARP violation in choices indicates a deviation from preference maximization. A higher number of such violations reflects a lower degree of individual consistency with preference maximization. We formally introduce GARP in the present setting by adapting Cosaert

[6]A preference relation $\succeq$ is monotone if $x \geq y$ implies $x \succeq y$ and $x > y$ implies $x \succeq y$ but not $y \succeq x$.

and Demuynck (2015)'s axiom of revealed preference for finite choice sets. For any pair of choices c^i and c^j, we denote that $c^i R^* c^j$ if there exists $x \in M^i$ such that $x \geq c^j$. In other words, for any pair of choices, the first is revealed preferred to the second if the first menu contains an alternative offering at least as many goods as the second choice. We also denote that $c^i R c^j$ if there exists some sequence $i, h, g, ..., m, j$ such that $c^i R^* c^h, c^h R^* c^g, ..., c^m R^* c^j$. Note that R is the transitive closure of R^*.

Definition 2 (GARP)**.** The data set $D = \{c^i, M^i\}_{i=1}^n$ satisfies the *Generalized Axiom of Revealed Preference* if for any pair of choices c^i and c^j, $c^i R c^j$ implies there exists no $x \in M^j$ such that $x > c^i$.

Unless the DM considers every available alternative in the direct procedure, his choices do not necessarily satisfy GARP, as the following example shows. Consider two menus, $M^1 = \{x, y, z\}$ and $M^2 = \{u, v, w\}$ with $z > u$ and $w > x$. 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 $\gamma(M^1) = \{x, y\}$ and $\gamma(M^2) = \{u, v\}$. Consequently, in the direct procedure, the DM's choices from M^1 and M^2 are $c^1 = x$ and $c^2 = u$. While we have $c^1 R c^2$, there exists $w \in M^2$ such that $w > c^1$, which constitutes a GARP violation.

How may GARP violations depend on the size of consideration sets in the direct procedure? Consider a different case where the DM has full consideration. In this case, his choices in the direct procedure are $\tilde{c}^1 = z$ and $\tilde{c}^2 = w$, 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 a data set to be generated by the direct procedure with full consideration and to be rationalized by standard preference maximization.

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

Remark 1. *Let $D = \{c^i, M^i\}_{i=1}^n$ and $\tilde{D} = \{\tilde{c}^i, M^i\}_{i=1}^n$ be two data sets, the following statements are true:*

(i) D does not necessarily satisfy GARP if D is generated by the direct procedure.

(ii) The number of GARP violations in D is weakly greater than that in $\tilde{D}$ if D ($\tilde{D}$,

respectively) is generated by the direct procedure with a preference relation $\succeq$ and a consideration set mapping γ ($\tilde{\gamma}$, respectively) such that $\tilde{\gamma}(M^i) \supseteq \gamma(M^i)$ for all i.

(iii) *D satisfies GARP if and only if D is generated by the direct procedure with full consideration.*

2.2 Sequential Elimination

Remark 1 implies that the DM, in the direct procedure, may miss the best options by not giving menus full consideration, leading to inconsistency with preference maximization, especially when his consideration sets contract. To address this problem, we propose sequential elimination, in which the DM eliminates options sequentially until only one survives, i.e., the choice.

To illustrate sequential elimination, consider again that the DM faces M^1. In this procedure, he goes through two rounds of elimination to make a choice from M^1. In the first round, he eliminates $e_1^1 = y$, leaving the menu to be $M^1 \setminus \{y\} = \{x,z\}$. In the second round, the DM confronts $\{x,z\}$ as a "new" menu, from which he eliminates $e_2^1 = x$, which reduces the menu to be $M^1 \setminus \{y,x\} = \{z\}$—representing his choice.

Formally, $E = \{e^i, M^i\}_{i=1}^n$ is an *elimination* data set, where e^i is a sequence of options $e^i = (e_1^i, ..., e_{|M^i|}^i) \in \prod_{r=1}^{|M^i|} \mathbb{R}_+^k$ such that $\bigcup_{r=1}^{|M^i|} \{e_r^i\} = M^i$. The sequence e^i fully describes the DM's elimination behavior when faced with a non-singleton menu M^i: he eliminates $e_1^i, ..., e_{|M^i|-1}^i$ sequentially, and finally chooses $e_{|M^i|}^i$ from M^i. For all i and $r = 1, .., |M^i|$, let E_r^i denote the remaining menu before the rth round of elimination by $E_r^i = \bigcup_{s=r}^{|M^i|} \{e_s^i\}$. We propose the following model of sequential elimination with limited attention.

Definition 3. The data set $D = \{c^i, M^i\}_{i=1}^n$ is *generated by sequential elimination* if there exist a preference relation $\succeq$, a consideration set mapping γ, and an elimination data set $E = \{e^i, M^i\}_{i=1}^n$ such that for all i and $r = 1, ..., |M^i|$,

(i) $e_r^i \in \gamma(E_r^i)$.

(ii) $\{x \in \gamma(E_r^i) | x \succeq e_r^i, x \neq e_r^i\} \neq \emptyset$ if $|E_r^i| \geq 2$.

(iii) $c^i = e_{|M^i|}^i$.

The first two conditions of Definition 3 state that the DM eliminates an alternative from his consideration set if he prefers another alternative 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 alternative as the choice.

The following proposition formally establishes the consistency of individual choice behavior in sequential elimination. All proofs are in Appendix A.

Proposition 1. *Let D be a data set. D satisfies GARP if and only if D is generated by sequential elimination.*

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

2.3 Testable Implication

Given individuals with limited attention represented by our DM, Remark 1 and Proposition 1 lead to the following hypothesis.

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 using choice data remains a significant challenge. Nevertheless, cognitive ability serves as a viable proxy for drawing such inferences, due to its decisive role in attention capacity (Kahneman, 1973). More specifically, individuals with lower cognitive ability tend to exhibit more limited attention than those with average or higher cognitive ability. Therefore, Hypothesis 1 will primarily be tested on this group in our experiment.

Two possibilities exist when a given sample of observations does not support the hypothesis. One possibility is that a considerable portion of sample subjects deliberately make inconsistent choices (e.g., Kahneman, 2003; DellaVigna, 2009). In this case, we would anticipate uniformly low consistency across both procedures. Alternatively, the sample subjects mostly possess substantial cognitive ability, which enables them to make consistent choices irrespective of choice procedures. As a result, sequential elimination may not significantly improve economic rationality. This possibility can be confirmed by observing high cognitive ability and high consistency in choices across both procedures.[7]

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 first engage in economic decision-making under their assigned choice procedures, followed by cognitive ability tests. The experiment concludes with a survey collecting additional data, including 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 gauges economic rationality by individual consistency with preference maximization using twenty risky decision problems adapted from Kim et al. (2018). Each problem comprises eleven distinct options, presented in random order.

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

Each option, denoted as (x_1, x_2), yields x_1 or x_2 tokens with equal probability. These problems are each derived from a unique budget line, characterized by a specific price-endowment combination.[8] We also incorporate an additional decision problem to assess comprehension.[9] This design aligns closely with our framework, posing a significant challenge to subjects in considering all options within each problem, despite the simplicity of individual options.

In our primary analysis, we use two measures of individual consistency based on GARP. The first one, referred to as *full consistency*, assigns a value of 1 to choices fully consistent with preference maximization (i.e., absence of GARP violations), and 0 otherwise. This provides a binary metric of individual consistency. The second one is a discrete metric that quantifies the degree of deviations from preference maximization in individual choices by counting the number of GARP violations. Individual choices demonstrating full consistency or fewer GARP violations indicate a higher degree of economic rationality.

Our robustness analysis incorporates additional measures of individual consistency. These measures include the number of SARP violations, which differs from GARP by excluding indifference between options in preference relations; the HM index, representing the minimal removal of observations needed to achieve consistency; and the CCEI, indicating the minimal wealth reduction required for choices to become consistent.[10] In addition to individual consistency, we include the count of FOSD violations as a crucial criterion for rational decision-making under risk. To be specific, a FOSD violation occurs when subjects choose an option (x_1, x_2) despite the availability of another distinct option (y_1, y_2) satisfying $y_2 \geq x_1$ and $y_1 \geq x_2$. Improved economic rationality

[8] See Appendix B for a graphical representation of a decision problem and a GARP violation using budget lines.

[9] 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). Failing to choose the option (99, 99) indicates a lack of comprehension.

[10] See also Apesteguia and Ballester (2015) and Halevy, Persitz, and Zrill (2018) for detailed discussions of measures of rationality. In this study, we express the HM index as the minimal number of observations that need to be removed, rather than as a proportion of the total number of observations. This approach is preferred for the tractability of the analysis, as all subjects are evaluated using the same set of twenty problems. The CCEI, which assumes choices are made from linear budget sets rather than finite sets of options, may not be as sensitive to changes in individual consistency as other measures in the experimental setting.

is signified by fewer SARP or FOSD violations, a reduced HM index, or a lower CCEI value.

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.[11] 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 unfamiliarity, they can reinstate any eliminated option from the trash box to the decision problem list with a click.

The *Direct Procedure*, our baseline treatment, mirrors the direct procedure and uses 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 or simply clicking behavior. We thus devise the Direct Procedure, wherein subjects make a choice after sequentially *examining* all options, clicking to move each to a *choice list* box on the screen's right side.[12] 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 minimal effort from subjects to engage with every option, thereby facilitating a lucid interpretation of the revealed economic rationality, particularly concerning individuals' limited attention spans. Second, both Sequential Elimination and the Direct Procedure exposure options to subjects in a similar manner, with differences arising solely from the procedural mechanics. Contrasting these treatments enables a robust evaluation of the extent to which Sequential Elimination mitigates the impacts

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

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

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, especially among those with limited attention. Such alignment can indicate the voluntary application of the procedure. Additionally, this treatment 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 chosen versus assigned.

3.2.3 Measuring Cognitive Ability

Cognitive ability is gauged 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). We also assessed selective attention and working memory capacity, which are critical cognitive functions associated with attentional limitation—a cognitive scientific concept used to describe constraints on the ability to process information. Selective attention is measured using the Stroop test (Stroop, 1935), wherein subjects identified the print color of incongruent words, such as "GREEN" printed in red. Working memory capacity is measured through the Sternberg test (Sternberg, 1966), tasking subjects to remember and recognize sequences of numbers.[13]

[13] More specifically, selective attention refers to the differential processing of simultaneous information sources (Johnston and Dark, 1986). Working memory capacity denotes the ability for "temporary storage and manipulation of the information" (Baddeley, 1992). 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 Stroop and Sternberg tests are implemented via the platform developed by Henninger et al. (2022). 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. See also Oberauer (2019) for a review of the close relationship between selective attention and working memory.

3.3 Other Design Details

3.3.1 Measuring Attitude toward Inconsistency

Our examination of sequential elimination's effect is further bolstered 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 rate how at ease they are with the inconsistency scenario on a 0 (least) to 10 (most at ease) scale. This rating indicates individual attitudes toward inconsistency, where higher scores reflect a less negative attitude.

3.3.2 Choice Revision

To provide additional elucidation on the underlying mechanism of sequential elimination, we incorporate an alternative simple choice procedure, namely choice revision, into the experimental design. This procedure offers individuals an opportunity to revise their choices, with recent studies showing its effect in improving economic rationality. Primarily, this improvement is observed in settings with a manageable number of options. On further consideration, choice revision might lead participants to reconsider all options, likely still constrained by limited attention. This implies that if our experiment reveals an effect of sequential elimination without one from choice revision, it would corroborate our framework, which posits sequential elimination as a mitigator of limited attention.

The specifics of our choice revision design are as follows. In the economic decision-making task, subjects subsequently engage with two identical sets of the aforementioned decision problems, referred to as Blocks A and B. Decision problem sequencing within each block is randomized and independent. The ordering of decision problems within each block is randomized and independent. Importantly, subjects are not informed of the two blocks' identical nature until they reach Block B. For each problem in Block B, the choice from the corresponding Block A problem is highlighted. Subjects can either restart their assigned choice procedure (by clicking on any option) or retain their Block A choices (via a shortcut button). To ensure incentive compatibility across blocks, subjects must designate one block for payment, from which a single decision problem is randomly drawn to determine their payoff.[14] Similar to Gaudeul and Crosetto (2019) and Yu, Zhang, and Zuo (2021), our design refrains from imparting normative axioms to subjects. 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 between Blocks A and 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. They received payoffs based on earned tokens 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.[15] Appendix C presents descriptive statistics of the sample and balance checks (Table C.1), along with histograms (Figure C.1 and Figure C.2). By design, cognitive and demographic factors, as well as attitudes toward inconsistency are

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

[15]A total of 253 (53% female) subjects were recruited and permitted to participate in the experiment only once. Of these, thirty subjects who did not pass the comprehension check were excluded from the analysis.

balanced across all three treatment groups. The mean age is approximately 23.731, and 75.3% of the subjects are aged between 18 and 25. All subjects have completed at least secondary education. 57% of subjects are engaged in undergraduate studies, and 33.2% have attained at least an undergraduate degree. Consequently, 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. Moreover, we examine the implications of sequential elimination for *high-IQ* subjects (those with IQ scores above the sample median) and for all subjects.[16] Table C.2 displays the subject breakdown by treatment and IQ group.

4.2 Effect of Sequential Elimination

We examine the impact of sequential elimination on economic rationality, subjecting Hypothesis 1 to an empirical test. We begin with descriptive statistics and then conduct regression analysis. Our analysis centers on economic rationality measured by full consistency and the number of GARP violations, and we further investigate additional economic rationality measures in the subsequent section for robustness.

Table 1 summarizes our descriptive findings. Panel A of the table indicates a significant increase of 26.3 percentage points (over 63.8%) in full consistency for low-IQ subjects under Sequential Elimination as compared with those under the Direct Procedure (0.675 vs. 0.412, $p = 0.001$, binomial test). Furthermore, GARP violations for these subjects are nearly 44.3% lower under Sequential Elimination than under the Direct Procedure (5.575 vs. 10.000, $p = 0.012$, Mann–Whitney U test). As we contrast the empirical cumulative distributions of GARP violations in Panel A of Figure 1, an upward shift is pronounced from the Direct Procedure group to the Sequential Elimination group, except for the far-right tails of the distributions. These results offer strong evidence supporting Hypothesis 1.

Low-IQ subjects reveal inferior economic rationality than their high-IQ counter-

[16] 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 4.74, 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.

parts, as evidenced by their significantly lower rates of full consistency overall (0.554 vs. 0.662, $p = 0.062$, binomial test) and more GARP violations (7.608 vs. 2.662, $p = 0.087$, Mann–Whitney U test). This is in line with existing evidence (e.g., Burks et al., 2009; Cappelen et al., 2023; Echenique, Imai, and Saito, 2023), reaffirming low-IQ subjects' susceptibility to limited attention. The second panels of both Table 1 and Figure 1 shows a negligible disparity in economic rationality among high-IQ subjects across the two treatment groups. Essentially, the improvement in economic rationality attributable to sequential elimination primarily benefits low-IQ subjects, aligning with our framework.

Panel C of Table 1 examines the overall impact of sequential elimination, considering subjects with varying cognitive abilities. On average, subjects demonstrate a considerable rise of 9.8 percentage points (17.5%) in full consistency under Sequential Elimination as compared with the Direct Procedure (0.658 vs. 0.560, $p = 0.100$, binomial test). Additionally, Sequential Elimination results in almost 27.3% fewer GARP violations relative to its counterpart, albeit at the margin of statistical significance (4.315 vs. 5.933, $p = 0.169$, Mann–Whitney U test). In Panel C of Figure 1, we observe that the disparity in the distributions of GARP violations between the two treatment groups, while noticeable, narrows when considering all subjects, as opposed to focusing on the low-IQ subset (as displayed in Panel A of the same figure). The findings suggestively corroborate the general efficacy of sequential elimination.

Our analysis proceeds by estimating the impact of Sequential Elimination on economic rationality relative to the Direct Procedure. This is presented in Table 2, where the first three columns apply probit regression models to estimate full consistency, and the next three perform negative binomial regression models to estimate GARP violations, incrementally adding control variables.[17]

Results consistently hold across all models for each measure, in terms of both magnitude and statistical significance. To illustrate, we focus on the findings in Columns

[17]The negative binomial distribution is preferred for count data when the Poisson distribution's assumption of equal conditional mean and variance does not hold (Cameron and Trivedi, 2013). It accommodates data dispersion without imposing the strict equality between the conditional mean and variance. In tables where negative binomial regression analyses are conducted, dispersion parameters are reported in their logarithmic form.

TABLE 1: Between-Treatment Comparison of Economic Rationality

	Overll 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)
Panel A: Low-IQ Subjects					
Full Consistency	0.554	0.675	0.412	0.263	0.001
	(0.058)	(0.075)	(0.086)	(0.114)	
GARP Violations	7.608	5.575	10.000	-4.425	0.012
	(1.855)	(2.581)	(2.644)	(3.695)	
Observations	74	40	34		
Panel B: High-IQ Subjects					
Full Consistency	0.662	0.636	0.683	-0.047	0.577
	(0.055)	(0.085)	(0.074)	(0.112)	
GARP Violations	2.662	2.788	2.561	0.227	0.553
	(0.721)	(0.919)	(1.080)	(1.418)	
Observations	74	33	41		
Panel C: All Subjects					
Full Consistency	0.608	0.658	0.560	0.098	0.100
	(0.040)	(0.056)	(0.058)	(0.080)	
GARP Violations	5.135	4.315	5.933	-1.618	0.169
	(1.013)	(1.474)	(1.394)	(2.029)	
Observations	148	75	73		

Note: The table compares economic rationality between the Direct Procedure and Sequential Elimination, as measured by full consistency—a binary metric (1 for no GARP violations, 0 otherwise)—and the count of GARP violations. Column 1 displays the overall mean. Columns 2 and 3 indicate the means specific to each treatment. Column 4 shows the differences between these means. Column 5 presents p-values from binomial tests for differences in full consistency and from Mann–Whitney U tests for differences in GARP violations, respectively. Standard errors are shown in parentheses.

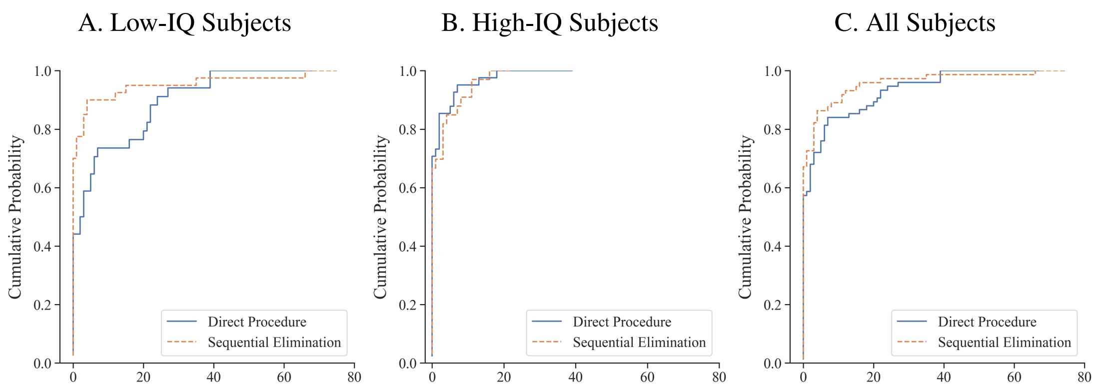

FIGURE 1: Empirical cumulative distributions of GARP violations across the Direct Procedure and Sequential Elimination groups. Panel A delineates the distribution for low-IQ subjects, Panel B for high-IQ subjects, and Panel C presents data for all subjects.

3 (on full consistency) and 6 (on GARP violations), which encompass the complete set of control variables. Column 3 reveals significant coefficients for Sequential Elimination at 0.696 ($se = 0.311$) and its interaction with high-IQ at -0.808 ($se = 0.438$). To offer a more accessible interpretation, we compute marginal effects as the average change in measures upon switching from the Direct Procedure to Sequential Elimination, based on regression estimates across observations. Accordingly, we find that Sequential Elimination leads to a surge of 0.258 ($se = 0.111$) in full consistency among low-IQ subjects. This represents an improvement of over 61.7% as compared with their estimated rate (0.418) when using the Direct Procedure. While an enhancement in full consistency of 0.108 ($se = 0.077$) also emerges across all subjects, this finding should be interpreted with caution due to its marginal statistical significance. In Column 6, we again observe significant coefficients of Sequential Elimination at -1.204 ($se = 0.502$), and its interaction with high-IQ at 1.167 ($se = 0.670$). These estimates represent that Sequential Elimination substantially reduces GARP violations among low-IQ subjects by 10.710 ($se = 5.550$), exceeding 70% of their estimated violations (15.296) associated with the counterpart treatment. Furthermore, the effect of Sequential Elimination on GARP violations among all subjects is also appreciable, resulting in a reduction of 5.444 ($se = 3.050$), nearly 60.8% of the estimated values (8.958) under the Direct Procedure. These findings demonstrate the economically meaningful effect of sequential

elimination, thereby fortifying compelling support for Hypothesis 1.

TABLE 2: Effect of Sequential Elimination on Economic Rationality

	Full Consistency			GARP Violations		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Regression Coefficients						
Sequential Elimination	0.695**	0.675**	0.696**	-1.011**	-0.958*	-1.204**
	(0.305)	(0.309)	(0.311)	(0.514)	(0.502)	(0.502)
High-IQ	0.626**	0.689**	0.697**	-1.405***	-1.754***	-1.805***
	(0.305)	(0.314)	(0.315)	(0.455)	(0.465)	(0.472)
Sequential Elimination × High-IQ	-0.816*	-0.812*	-0.808*	1.214*	1.118*	1.167*
	(0.429)	(0.438)	(0.438)	(0.696)	(0.677)	(0.670)
Panel B: Marginal Effects of Sequential Elimination						
Low-IQ Subjects	0.266**	0.251**	0.258**	-7.465*	-8.519*	-10.710*
	(0.112)	(0.111)	(0.111)	(4.290)	(4.759)	(5.550)
High-IQ Subjects	-0.045	-0.048	-0.039	0.645	0.414	-0.093
	(0.111)	(0.108)	(0.107)	(1.611)	(1.199)	(1.171)
All Subjects	0.112	0.100	0.108	-4.190	-4.048	-5.444*
	(0.079)	(0.077)	(0.077)	(2.870)	(2.559)	(3.050)
Additional Controls						
Cognitive Functions	Yes	Yes	Yes	Yes	Yes	Yes
Demographics		Yes	Yes		Yes	Yes
Attitude toward Inconsistency			Yes			Yes
Log Alpha				1.829***	1.749***	1.713***
				(0.160)	(0.162)	(0.162)
Log Likelihood	-94.795	-91.809	-91.447	-296.413	-293.074	-291.832
Observations	148	148	148	148	148	148

Note: The table estimates the effect of sequential elimination on economic rationality. Columns 1 to 3 present probit regression results for full consistency. Columns 4 to 6 display negative binomial regression results for GARP violations. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different IQ 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. Additional 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.

4.2.1 Robustness Analysis

The effect of Sequential Elimination is further corroborated by additional measures of economic rationality, as detailed in Table 3.[18] The initial three columns illustrate that the effect of Sequential Elimination remains substantial when evaluated through diverse measures of individual consistency. In Column 1, the observed effects on reducing SARP violations, both among low-IQ subjects and all subjects, mirror quantitatively

[18]Negative binomial regression models are employed to estimate SARP violations, the HM index, and FOSD violations due to the nature of these measures, while OLS regression models are utilized for analyzing the CCEI.

and qualitatively the effects on GARP violations (as shown in Column 6 of Table 2). Columns 2 and 3 indicate a significant effect on the HM index for low-IQ subjects, with a drop of 0.400 ($se = 0.216$), and marginal significance for the CCEI, with a decrease of 0.027 ($se = 0.017$). These reductions correspond to approximately 43.3% and 50% of their respective estimated values (0.923 and 0.054) under the Direct Procedure.

In addition to individual consistency, the last column examines FOSD violations, revealing a noteworthy decrease of 0.451 ($se = 0.205$) attributed to Sequential Elimination. The estimates suggest that this effect is primarily driven by the significant reductions in FOSD violations of 0.860 ($se = 0.390$) among high-IQ subjects. This finding, narrowly interpreted, raises the possibility that FOSD violations may result from factors beyond limited attention. More broadly, it indicates that combining sequential elimination with a high level of cognitive ability can enhance individual conformity with FOSD.

Alternative regression specifications, presented in Appendix D, also scrutinize our primary results. Table D.1 replicates Table 2 with all the measures, this time incorporating the interaction between Sequential Elimination and the numeric variable IQ instead of the categorical variable high-IQ. The results confirm the interaction effect between Sequential Elimination and IQ across all consistency measures. In the analysis of the low-IQ subject subsample, as shown in Table D.2, we observe that the impact of Sequential Elimination on full consistency, the HM index, and the CCEI remains virtually identical to the results obtained from the full sample. Meanwhile, the magnitude of its effect on both GARP and SARP violations increases, albeit with attenuated statistical significance.[19]

Table D.3 and Table D.4 replicate Table 2 and include all the measures, with subjects categorized based on their IQ scores within the distribution, first by terciles and then by quartiles. Notably, a uniform pattern emerges, revealing that Sequential Elimination ameliorates individual inconsistency among subjects with IQ scores in the lowest tiers, significantly across all measures. For instance, Column 2 of Table D.3 and Ta-

[19] In the estimations presented in Table D.2, the regression coefficients of Sequential Elimination for full consistency, the HM index, GARP, and SARP violations are statistically significant, while the coefficient for the CCEI is marginally significant.

ble D.4 indicate that the procedure reduces GARP violations among subjects with IQ scores in the lowest tercile and quartile by 9.845 ($se = 5.368$) and 9.009 ($se = 4.622$), respectively, approximately 81.7% and 78.6% of their estimated violations (12.047 and 11.469) under the Direct Procedure.[20] The results suggest that sequential elimination has a more pronounced impact on individuals who are more susceptible to limited attention, consistent with our framework.

4.3 Preference for Sequential Elimination

We explore the determinants of individual preference for sequential elimination by analyzing the Procedure Procedure treatment. Within this treatment, 82.1% of low-IQ subjects select Sequential Elimination over the Direct Procedure, in contrast to 47.2% of high-IQ subjects. This statistically significant difference ($p < 0.001$, binomial test) preliminarily indicates a negative correlation between cognitive ability and the preference for sequential elimination..

Table 4 presents probit regression results examining the impact of potentially relevant factors on this preference. Focusing solely on cognitive ability, significant coefficients are detected: -0.807 ($se = 0.342$) for the high-IQ variable and -0.175 ($se = 0.069$) for the IQ variable in Columns 1 and 2, respectively, paired with -0.131 ($se = 0.068$) and -0.121 ($se = 0.068$) for working memory. These estimates remain robust when including demographics and attitude toward inconsistency in Columns 4 and 5, reinforcing the evidence of a stronger preference for Sequential Elimination among individuals with lower cognitive abilities. Among non-cognitive factors, education demonstrates a positive effect on this procedural preference, as evidenced by the consistent coefficients in the last three columns, for instance, 0.409 ($se = 0.164$) in Column 5. This finding suggests that education may play a role in promoting sequential elimination.

[20] Table D.3 and Table D.4 also show that the reduction in FOSD violations attributed to Sequential Elimination primarily benefits subjects within the second tercile and the third quartile of IQ scores. In addition, Appendix D provides an analysis of individual behaviors during the two main treatments. The analysis suggests a tendency among subjects to examine options according to their presentation order under the Direct Procedure, irrespective of their cognitive abilities. In contrast, the propensity to eliminate options following their presentation order under Sequential Elimination is considerably less evident. Despite this disparity, the data reveal no significant differences between the treatments in terms of the impact of presentation order on individual choices.

TABLE 3: Robustness of Sequential Elimination's Effect on Economic Rationality

	SARP Violations	HM Index	CCEI	FOSD Violations
	(1)	(2)	(3)	(4)
Panel A: Regression Coefficients				
Sequential Elimination	-1.090**	-0.567*	-0.027	-0.278
	(0.476)	(0.323)	(0.017)	(0.456)
High-IQ	-1.623***	-0.796**	-0.038***	0.594
	(0.448)	(0.317)	(0.015)	(0.441)
Sequential Elimination × High-IQ	1.071*	0.780	0.035*	-1.145*
	(0.650)	(0.481)	(0.019)	(0.637)
Panel B: Marginal Effects of Sequential Elimination				
Low-IQ Subjects	-10.219*	-0.400*	-0.027	-0.152
	(5.244)	(0.216)	(0.017)	(0.248)
High-IQ Subjects	-0.057	0.099	0.008	-0.860**
	(1.395)	(0.158)	(0.010)	(0.390)
All Subjects	-5.197*	-0.161	-0.010	-0.451**
	(2.901)	(0.132)	(0.010)	(0.205)
Additional Controls	Yes	Yes	Yes	Yes
Log Alpha	1.703***	-1.416*		0.420
	(0.162)	(0.809)		(0.371)
Log Likelihood	-311.451	-143.694	211.400	-144.116
Observations	148	148	148	148

Note: The table estimates the effect of sequential elimination on economic rationality using a diverse set of economic rationality measures. Columns 1, 2 and 4 present negative binomial regression results for SARP violations, the HM index, and FOSD violations, respectively. Column 3 displays ordinary least squares regression results for the CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different IQ 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. Additional 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.

4.3.1 Impact of Procedural Preferences

Table 5 further investigates the relationship between procedural preferences and economic rationality. The initial two columns of the table compare economic rationality between subjects selecting Sequential Elimination (in the Procedure Preference treatment) and those assigned to it. The estimates reveal no significant impact of Procedure Preference on either full consistency or GARP violations. Importantly, this implies comparable degrees of economic rationality, whether individuals opt for or are assigned

TABLE 4: Determinants of Individual Preference for Sequential Elimination

	Preference for Sequential Elimination				
	(1)	(2)	(3)	(4)	(5)
High-IQ	-0.807**			-0.667*	
	(0.342)			(0.362)	
IQ		-0.175**			-0.151**
		(0.069)			(0.074)
Working Memory	-0.133**	-0.121*		-0.146*	-0.137*
	(0.068)	(0.068)		(0.077)	(0.075)
Selective Attention	-0.066	-0.076		-0.081	-0.089
	(0.054)	(0.055)		(0.058)	(0.059)
Education			0.335**	0.397**	0.409**
			(0.161)	(0.162)	(0.164)
Age				-0.022	-0.015
				(0.026)	(0.026)
Female				0.394	0.391
				(0.340)	(0.339)
Attitude toward Inconsistency				0.021	0.011
				(0.070)	(0.070)
Constant	2.924***	3.478***	-0.173	2.751**	3.135**
	(1.043)	(1.060)	(0.302)	(1.317)	(1.341)
Observations	75	75	75	75	75
Log Likelihood	-40.921	-40.243	-45.916	-38.138	-37.380

Note: This table explores the determinants of preference for sequential elimination through probit regression analysis on data from the Procedure Preference treatment, with a binary dependent variable where 1 indicates a choice for Sequential Elimination and 0 indicates otherwise. Robust standard errors are shown in parentheses.

Sequential Elimination.

The next two columns of Table 5 replicate this analysis in the Direct Procedure context. An interaction between Procedure Preference and high-IQ significantly affects GARP violations, represented by a coefficient of 1.779 ($se = 0.865$) in Column 4. The column also indicates a marginally significant increase in GARP violations by 4.088 ($se = 2.899$), among high-IQ subjects who select the Direct Procedure as compared to those assigned to it. Considering that subjects assigned to the Direct Procedure likely includes individuals with diverse procedural preferences, this finding suggests that a less pronounced preference for the direct procedure is associated with a higher level of economic rationality among individuals with high cognitive abilities.

The last two columns in the table assess the collective impact of Procedure Preference, using those assigned to the Direct Procedure as a baseline. Column 5 shows that Procedure Preference considerably raises full consistency among low-IQ subjects, as demonstrated by a coefficient of 0.700 ($se = 0.312$) and a marginal effect of 0.260 ($se = 0.112$). Perhaps more importantly, this improvement in economic rationality attributed to Procedure Preference resembles that observed with the Sequential Elimination treatment, both quantitatively and qualitatively (as shown in Column 3 of Table 2). Additionally, Column 6 presents suggestive evidence of a decline in GARP violations associated with Procedure Preference, indicated by a coefficient of -0.692 ($se = 0.445$) and a marginal effect of -6.909 ($se = 4.821$), albeit bordering on significance.

To summarize, our analysis suggests that the impact of procedure preference on economic rationality may hinge on the available choice procedures.[21] Individuals with low cognitive abilities, the primary focus of this study concerning limited attention, reveal a marked preference for sequential elimination. In consequence, sequential elimination may inherently improve their economic rationality by aligning with their procedural preferences.

5 Further Discussion

Our investigation expands in two directions to assess the further validity of our framework and sequential elimination. First, we scrutinize the procedure's role in eliciting risk preferences under limited attention, delving into its subsequent implications for individual behavior. Additionally, we investigate the impact of choice revision on economic rationality. This serves as a supplementary analysis that facilitates a rigorous understanding of the significance of sequential elimination's effect in relation to mitigating limited attention. Furthermore, we discuss the descriptive and normative roles of choice procedures in light of our results, culminating in the real-world impacts of sequential elimination.

[21]The observed impact remains consistent in the additional analysis presented in Appendix D Table D.7. The first two columns of this table juxtapose high-IQ subjects selecting the Direct Procedure against those assigned to it, unveiling a negative correlation between this preference and economic rationality among them. The last two columns contrast low-IQ subjects assigned to the Procedure Preference treatment with those assigned to the Direct Procedure, supporting the notion that the former results in an improvement in economic rationality for these individuals.

TABLE 5: Impact of Procedure Preference on Economic Rationality

	Sequential Elimination Selected vs. Assigned		Direct Procedure Selected vs. Assigned		Procedure Preference vs. Direct Procedure	
	Full Consistency (1)	GARP Violations (2)	Full Consistency (3)	GARP Violations (4)	Full Consistency (5)	GARP Violations (6)
Panel A: Regression Coefficients						
Procedure Preference	0.048	0.433	0.468	-0.809	0.700**	-0.692
	(0.325)	(0.540)	(0.560)	(0.730)	(0.312)	(0.445)
High-IQ	-0.186	-0.172	0.737**	-1.758***	0.676**	-1.643***
	(0.337)	(0.514)	(0.324)	(0.439)	(0.318)	(0.462)
Procedure Preference × High-IQ	-0.071	-0.748	-0.939	1.779**	-1.015**	1.221*
	(0.499)	(0.826)	(0.657)	(0.865)	(0.433)	(0.674)
Panel B: Marginal Effects of Procedure Preference						
Low-IQ Subjects	0.016	2.776	0.181	-8.027	0.260**	-6.909
	(0.107)	(3.871)	(0.213)	(6.918)	(0.112)	(4.821)
High-IQ Subjects	-0.008	-1.166	-0.176	4.088	-0.115	1.864
	(0.135)	(2.125)	(0.139)	(2.899)	(0.109)	(1.890)
All Subjects	0.006	1.782	-0.031	-0.633	0.068	-2.682
	(0.084)	(2.951)	(0.122)	(3.199)	(0.078)	(2.652)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.885***		1.544***		1.777***
		(0.190)		(0.193)		(0.157)
Log Likelihood	-73.068	-208.974	-65.194	-229.315	-94.195	-318.134
Observations	122	122	101	101	150	150

Note: The table estimates the impacts of procedure preference on economic rationality. The first two columns (1 and 2) compare the economic rationality of subjects who select Sequential Elimination in the Procedure Preference treatment (*Sequential Elimination selected*) with those assigned to it (*Sequential Elimination assigned*). The subsequent two columns (3 and 4) perform a similar analysis for subjects who select (*the Direct Procedure selected*) against those assigned to it (*the Direct Procedure assigned*). The last two columns (5 and 6) examine economic rationality in the Procedure Preference treatment relative to the Direct Procedure treatment. For each pair, the first column (1, 3, and 5) presents probit regression results for full consistency, while the second column (2, 4, and 6) displays negative binomial regression results for GARP violations. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Procedure Preference for different IQ 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. Additional 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.

5.1 Eliciting Risk Preferences

While existing literature predominantly suggests a negative relationship between cognitive ability and risk aversion (Dohmen et al., 2010; Benjamin, Brown, and Shapiro, 2013; Dohmen et al., 2018), this correlation is not always replicated, and occasionally it reverses (Tymula et al., 2012; Andersson et al., 2016). Specifically, Andersson et al. (2016) identify a positive correlation, using a non-standard multiple-price list setting that provides increased opportunities for individuals to err toward riskier choices.[22]

[22]Note that other studies indicating a negative relationship typically derive their findings from relatively simple choice settings where decision problems do not comprise numerous options (e.g., two or

This implies that decision errors caused by choice settings may hinder the accurate elicitation of risk preferences among individuals with lower cognitive abilities. Building on this implication and our primary findings, we posit that sequential elimination could aid in recovering risk preferences by reducing errors due to limited attention.

We gauge risk preferences using constant relative risk aversion (CRRA) utility indices, recovered from subjects' choices.[23] In Table 6, we present the results from OLS estimations of the recovered CRRA utility index. This first three columns encompass data from both the Direct Procedure and Sequential Elimination groups. In Column 1, considering cognitive ability alongside demographics and attitude toward inconsistency, we observe a negative IQ coefficient of -0.383 ($se = 0.227$), echoing the inverse relationship documented in prior studies. In Column 2, upon accounting for the impact of Sequential Elimination, the IQ coefficient attenuates to -0.367 ($se = 0.223$), attaining marginal significance.

In Column 3, where the interaction between IQ and Sequential Elimination is incorporated, only the coefficient of the interaction term shows modest significance at -0.814 ($se = 0.550$). This introduces the possibility that the association of cognitive ability with elicited risk preferences varies between the two procedures. To verify this, the impact of IQ within the Direct Procedure group is examined in Column 4. This does not replicate the negative correlation observed at the aggregate level (as shown in Columns 1 and 2).[24] Conversely, the negative correlation re-emerges in Column 5, which focuses on the Sequential Eliminations group, as indicated by a marginally significant IQ coefficient at -0.530 ($se = 0.351$) and a significant coefficient for selection attention at -0.669 ($se = 0.379$).

Collectively, our data reflect a negative correlation between cognitive ability and risk aversion within the context of limited attention, primarily attributable to sequential elimination. This aligns with our main results, which have theoretically and experimentally validated individual consistency under the procedure. These findings suggest the

three).

[23]Under the assumption of the CRRA expected utility model, the CRRA utility indices are recovered using a nonlinear least squares approach, implemented with the algorithm provided by Halevy, Persitz, and Zrill (2018).

[24]To be specific, within the Direct Procedure estimation, the coefficients for IQ and working memory are not significant, whereas the coefficient for selective attention is significantly positive.

potential of sequential elimination to elicit individual preferences in decision problems marked by limited attention.

TABLE 6: Effect of Sequential Elimination on Elicited Risk Preferences

	CRRA Utility Index				
	Direct Procedure & Sequential Elimination			Direct Procedure	Sequential Elimination
	(1)	(2)	(3)	(4)	(5)
IQ	-0.383*	-0.367	0.073	-0.100	-0.530
	(0.227)	(0.223)	(0.311)	(0.268)	(0.351)
Selective attention	-0.222	-0.205	-0.180	0.327**	-0.669*
	(0.265)	(0.254)	(0.239)	(0.151)	(0.379)
Working memory	-0.395	-0.392	-0.438	-0.254	-0.564
	(0.342)	(0.350)	(0.366)	(0.418)	(0.522)
Sequential Elimination		1.443	5.305		
		(1.450)	(3.457)		
Sequential Elimination × IQ			-0.814		
			(0.550)		
Age	-0.061	-0.077	-0.076	0.341	-0.211
	(0.115)	(0.126)	(0.126)	(0.262)	(0.137)
Female	1.971	2.014	2.026	2.223	2.512
	(1.407)	(1.409)	(1.406)	(1.564)	(2.406)
Education	0.626	0.664	0.596	-0.299	1.068
	(0.702)	(0.705)	(0.712)	(0.960)	(1.076)
Attitude toward Inconsistency	0.077	0.103	0.079	0.169	-0.281
	(0.282)	(0.275)	(0.279)	(0.311)	(0.523)
Constant	11.192	10.243	8.195	-9.335*	25.501**
	(7.369)	(6.716)	(5.800)	(5.116)	(12.022)
Observations	148	148	148	75	73

Note: This table presents the ordinary least squares regression results for the recovered CRRA utility index. Columns 1 to 3 analyze subjects from both the Direct Procedure and Sequential Elimination, incorporating different sets of control variables. Column 4 specifically examines the Direct Procedure group, and Column 5 is dedicated to the Sequential Elimination group. Robust standard errors are shown in parentheses.

5.2 Alternative Choice Procedure

Table 7 presents the estimated effects of choice revision using data from subjects in the Direct Procedure who revised their choices. The first five columns show that choice revision does not significantly impact individual consistency. However, the last column reveals a considerable increase of 0.258 ($se = 0.132$) in FOSD violations among low-IQ subjects due to choice revision.[25] Appendix D Table D.8, which focuses on the Sequential Elimination group, finds no significant impact of choice revision on either FOSD violations or individual consistency. Nevertheless, the pattern noted in the Direct Procedure persists in the regression analyses of Appendix D Table D.9, which incorporates a triple interaction involving choice revision, high-IQ, and Sequential Elimination, utilizing data from both treatments.

Our analysis suggests that choice revision, when involving no specific guidance, may not effectively mitigate the impacts of limited attention, highlighting the persistence of this constraint. This enriches our understanding of sequential elimination, underscoring its significance in tackling limited attention. Interpretation of the results, when considered alongside the extant body of work, reveals that the efficacy of various choice procedures likely hinges on their mechanisms to address the root causes of rationality deviations.

5.3 Descriptive and Normative Roles

Our study offers potential insights into reconciling individual inconsistency with preference maximization within economic theories. In response to this anomaly, which challenges the cornerstone of neoclassical economics, extensive research has explored how choice procedures can *describe* individual inconsistency (e.g., Manzini and Mariotti, 2007; Masatlioglu and Nakajima, 2007; Salant, 2011). At the heart of the challenge lies the question of whether individual inconsistency and choice procedures are entrenched. Accordingly, we adopt an alternative approach, investigating the variability of choice procedures and their impacts in *shaping* 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,

[25] This is accompanied by a significant regression coefficient for revision at 0.543 ($se = 0.188$), as well as a significant interaction coefficient between revision and high-IQ at -1.047 ($se = 0.353$).

TABLE 7: Choice Revision and Economic Rationality (Direct Procedure Data)

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Revision	-0.343	-0.419	-0.419	-0.000	-0.008	0.543***
	(0.339)	(0.467)	(0.441)	(0.237)	(0.017)	(0.188)
High-IQ	0.646	-2.172***	-2.116***	-1.047***	-0.033	1.124**
	(0.411)	(0.635)	(0.614)	(0.403)	(0.021)	(0.523)
Revision × High-IQ	0.472	0.259	0.324	0.105	0.002	-1.047***
	(0.455)	(0.634)	(0.579)	(0.420)	(0.018)	(0.353)
Panel B: Marginal Effects of Revision						
Low-IQ Subjects	-0.125	-5.058	-6.027	-0.000	-0.008	0.258*
	(0.124)	(6.401)	(7.454)	(0.225)	(0.017)	(0.132)
High-IQ Subjects	0.040	-0.248	-0.193	0.037	-0.006	-0.436
	(0.096)	(0.620)	(0.702)	(0.123)	(0.008)	(0.321)
All Subjects	-0.027	-2.879	-3.504	0.021	-0.007	-0.154
	(0.076)	(3.820)	(4.716)	(0.121)	(0.008)	(0.196)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.487***	1.470***	-15.398***		0.142
		(0.254)	(0.254)	(1.172)		(0.453)
Log Likelihood	-55.251	-180.003	-193.268	-90.712	152.309	-105.783
Observations	96	96	96	96	96	96

Note: This table estimates the impacts of choice revision on economic rationality within the Direct Procedure. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of choice revision for different IQ groups, indicating the average change in the dependent variables upon switching from initial to revised choices across observations. All models include a constant term. Additional 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.

2020; Breig and Feldman, 2020; Nielsen and Rehbeck, 2022). 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, offer 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 pronounced among individuals with lower cognitive abilities, suggests its significance may reach the wider low cognitive ability population—a substantial 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 adaptability of sequential elimination position it as a viable strategy for policymakers and institutions to assist individuals in consequential decisions at a relatively low cost. Our findings suggest that it might be sufficient for policymakers and institutions to offer the procedure to improve decision-making. Especially for those with lower cognitive abilities, this approach could facilitate more informed choices without limiting individual choices of procedures, thus rendering it appealing for institutional design (Thaler and Sunstein, 2003; Chetty, 2015). For example, financial institutions could be required to propose sequential elimination for customers choosing among loan schemes, retirement plans, or insurance policies. Governments might consider integrating the procedure into public digital and mobile platforms. We demonstrate the feasibility of these applications by presenting an accessible implementation of sequential elimination, which is adaptable to a variety of institutional frameworks beyond the present context.

6 Concluding Remarks

This paper presents a theoretical foundation and experimental validation for the efficacy of sequential elimination—a choice procedure well documented 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 individual 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 lower cognitive abilities. Our results enrich the literature on economic rationality by discerning both theoretical and empirical conditions that reveal individual consistency.

Beyond decision-making under risk, examining the robustness of sequential elimination across diverse choice domains—such as consumer goods, intertemporal choices, and altruistic choices—would be beneficial. 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 apart from limited attention.

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A Proof of Proposition 1

Let $D = \{c^i, M^i\}_{i=1}^n$ be a data set. Consider the following conditions:

[1] D satisfies GARP.

[2] D is generated by sequential elimination.

[3] There exists a preference relation $\succeq$ over X such that for all i, $c^i \in \{x \in M^i | x \succeq y \; \forall y \in M^i\}$.

By a theorem of Cosaert and Demuynck (2015), we have that [1] if and only if [3]. Hence in the following proof, I show equivalently that [2] if and only if [3].

[3] implies [2]. Suppose that [3] is true. Define $\gamma(M) = M$ for all $M \in \mathscr{X}$. Given $D = \{c^i, M^i\}_{i=1}^n$, define $E = \{e^i, M^i\}_{i=1}^n$ such that for all i: if $|M^i| \geq 2$, then $e^i = (e^i_1, ..., e^i_{|M^i-1|}, c^i)$ with $\bigcup_{r=1}^{|M^i|} \{e^i_r\} = M^i$; if $|M^i| = 1$, then $e^i = (c^i)$. For all i and $r = 1, ..., |M^i|$, we have $e^i_r \in \gamma(E^i_r)$ (Definition 3 (i)); $c^i \in \{x \in \gamma(E^i_r) | x \succeq e^i_r, x \neq e^i_r\} \neq \emptyset$ if $|E^i_r| \geq 2$ (Definition 3 (ii)); and $c_i = e^i_{|M^i|}$ (Definition 3 (iii)). Thus, D is generated by sequential elimination.

[2] implies [3]. Suppose that [2] is true. Let $\succeq$, γ, and $E = \{e^i, M^i\}_{i=1}^n$ be the preference relation, consideration set mapping, and elimination data set that satisfy the conditions in Definition 3. Suppose by contradiction that there exists some $j \in \{1, ..., n\}$ such that $c^j = e^j_{|M^j|} \notin \{x \in M^j | x \succeq y \; \forall y \in M^j\}$. Since $\succeq$ is complete and transitive, $\{x \in M^j | x \succeq y \; \forall y \in M^j\} \neq \emptyset$. Then there must exist some $r \in \{0, ..., |M^j - 1|\}$ such that $e^j_r \in \{x \in M^j | x \succeq y \; \forall y \in M^j\}$ and $\{x \in E^i_r | x \succeq e^i_r, x \neq e^i_r\} = \emptyset$. This implies $\{x \in \gamma(E^i_r) | x \succeq e^i_r, x \neq e^i_r\} = \emptyset$, which is a contradiction to Definition 3 (ii). Therefore, we have that for all i, $c^i \in \{x \in M^i | x \succeq y \; \forall y \in M^i\}$.

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 Representation

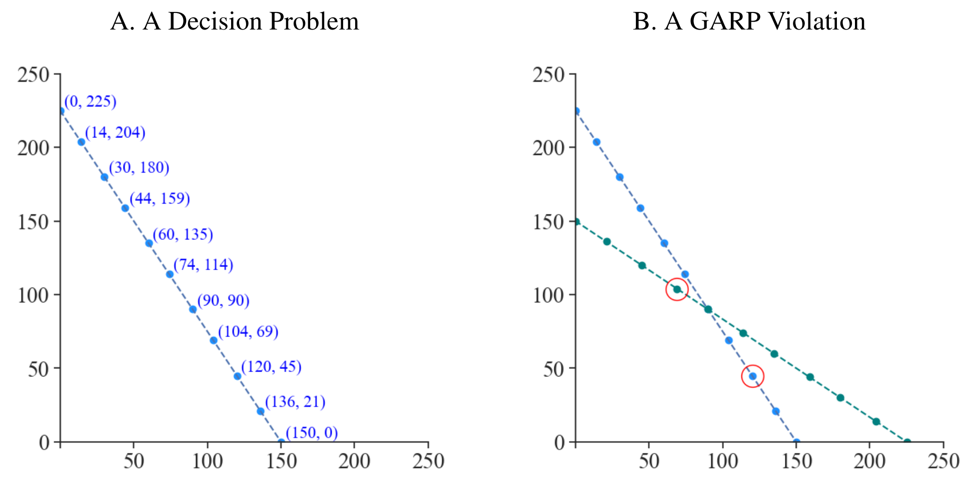


FIGURE B.1: Decision Problem and GARP Violation on Budget Lines

Note: As displayed in Figure B.1(a), each budget line represents a menu of options in the experiment. Figure B.1(b) shows a pair of choices (indicated by the red circles) in the two decision problems that violate GARP.

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%.

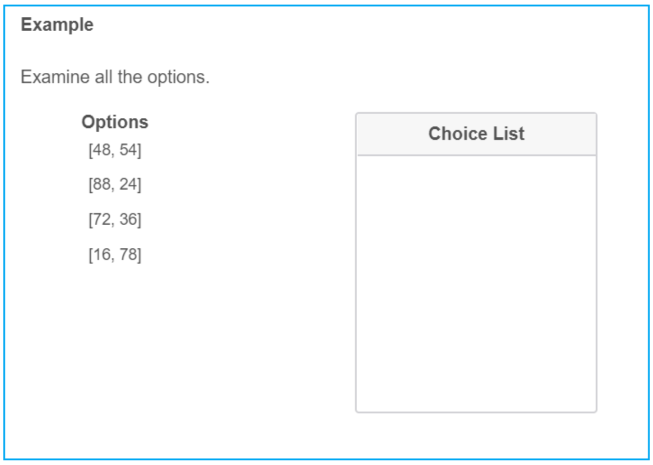
In each decision problem, you are encouraged to examine all options and should choose only one option that you prefer. There is no right and wrong answer to each decision problem. We are interested in studying your preferences.

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.

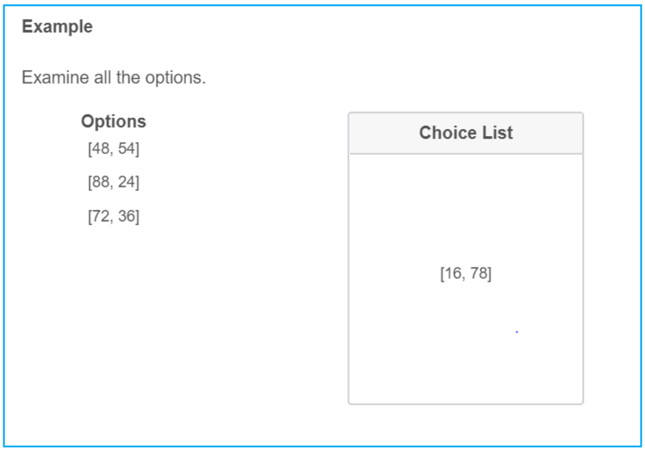
You will earn real money, depending on your decisions. Please make careful decisions.

B.2.2.1 Direct Procedure (Block A)

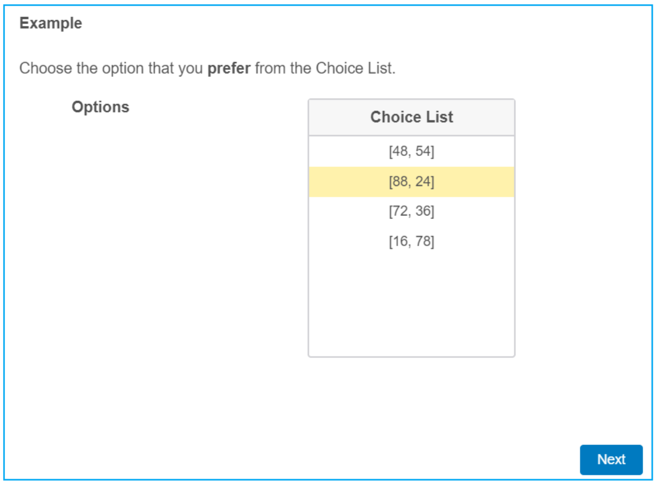
In this block, you will participate in 21 decision problems. You will make decisions by a procedure called "**sequential examination**". You will be asked to sequentially examine, one by one, options by clicking on them. Then you will be asked to choose only **one** option that you **prefer**. Below,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

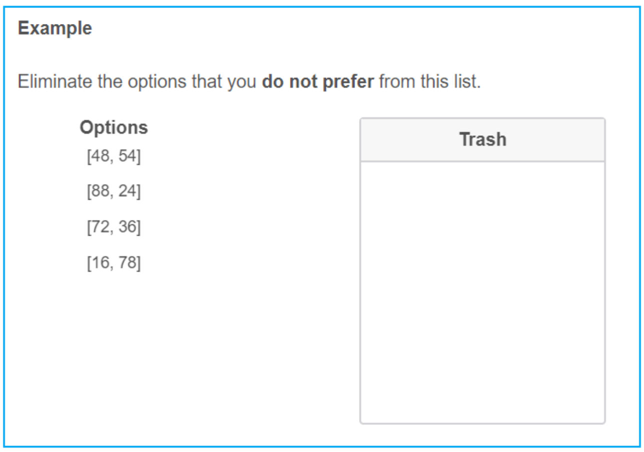
To familiarize you with the decision problems, you will have a practice problem. It will not affect your payment. Then you will be asked to complete all the problems.

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

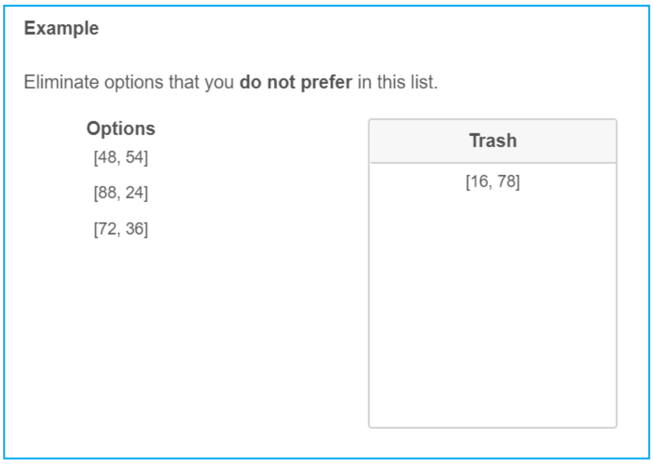
B.2.2.2 Sequential Elimination (Block A)

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:

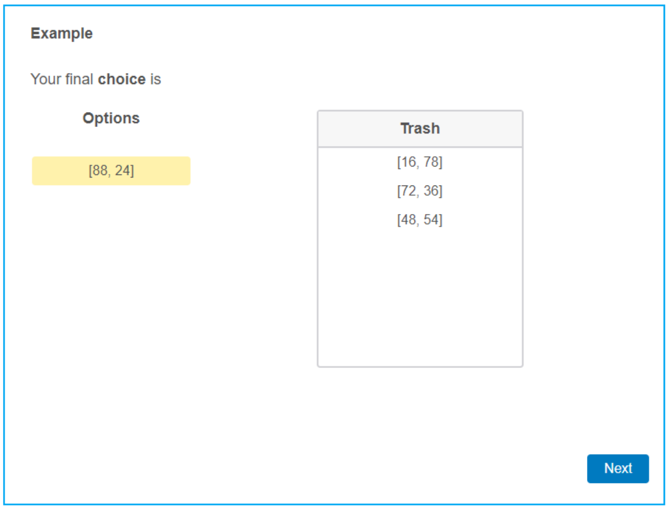


For instance, if you eliminate [16, 78] by clicking on it, it will be moved to the "**Trash**".



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, supposed 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.

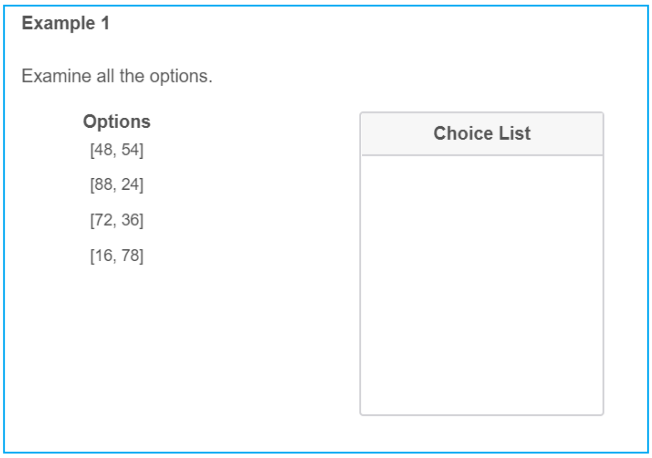
Important: Once you have clicked on "Next", you **cannot** go back and change your choice.

B.2.2.3 Procedure Preference (Block A)

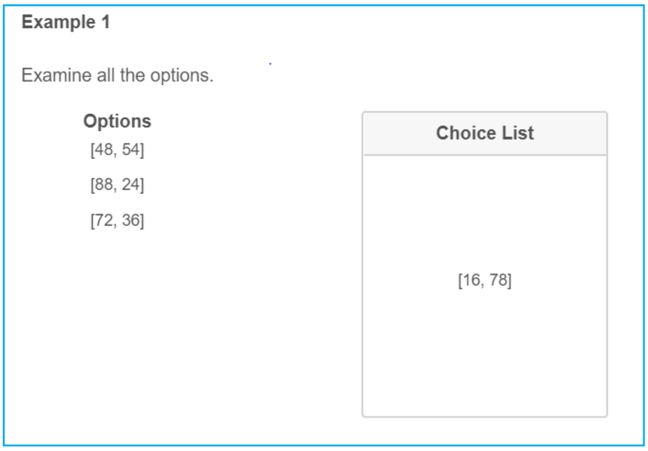
First, you have to make a choice between two choice procedures: sequential examination and sequential elimination. The two procedures will be explained below with examples. Then you will participate in 21 decision problems using the procedure chosen by you.

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**.

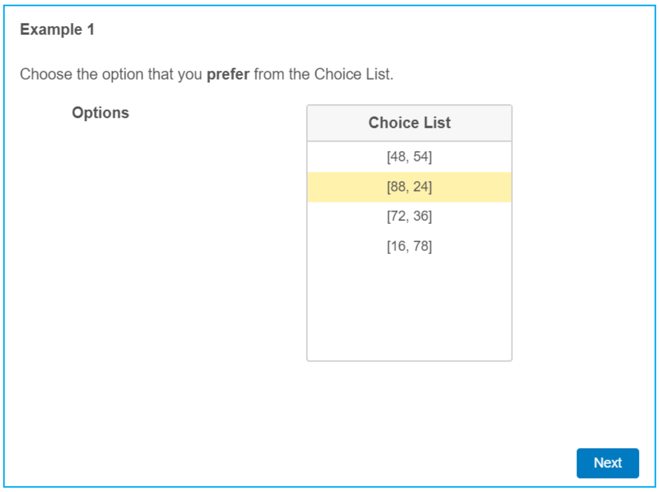
Below, you can see an example of sequential examination:



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



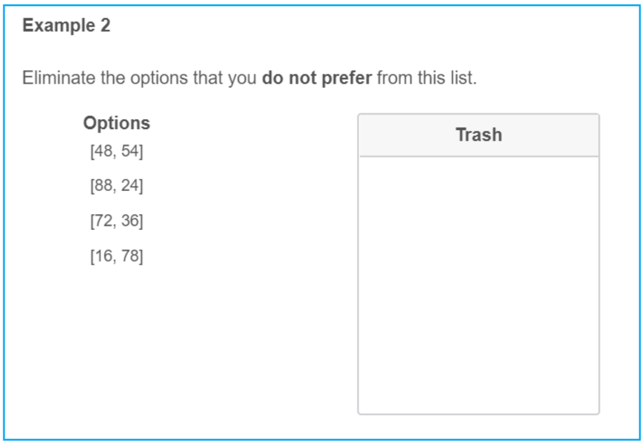
You should examine all the options by clicking on them. Then you can choose the option that you prefer in the "**Choice List**" by clicking on it. Your final choice will be highlighted in yellow. For instance, in the screen below, your choice is [88, 24].



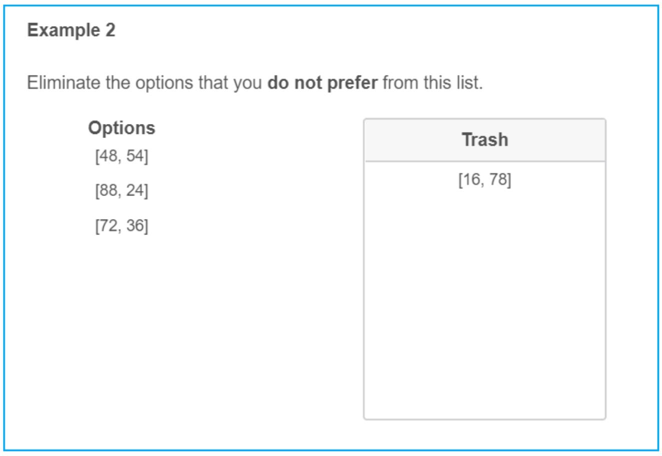
You should click on "Next" to confirm your choice and proceed to the next problem.

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:



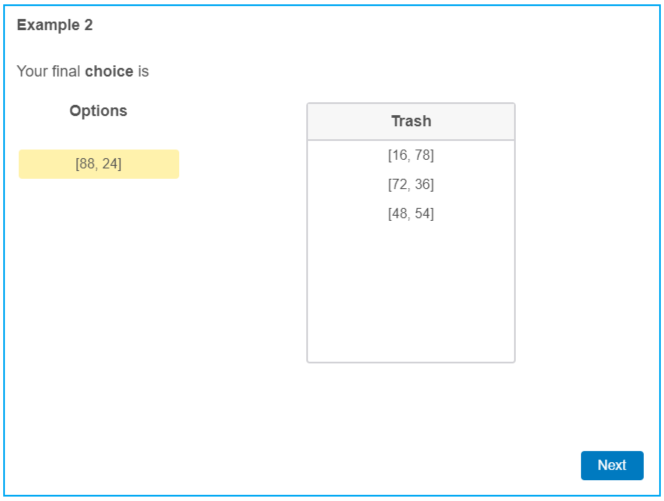
For instance, if you eliminate [16, 78] by clicking on it, it will be moved to the "**Trash**".



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, supposed 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

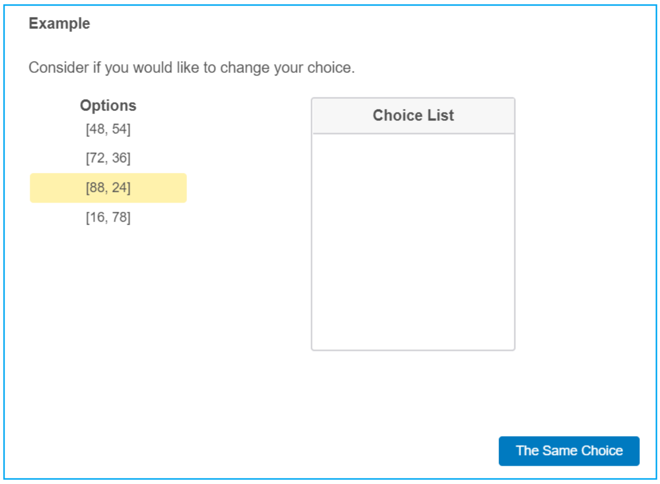
Please indicate which procedure that you would like to use in Section 1.

- The Direct Procedure
- Sequential Elimination

B.2.2.5 Direct Procedure (Block B)

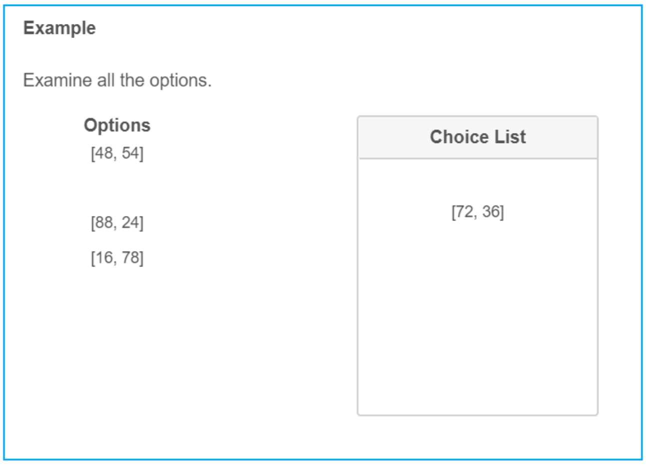
In this block, you will confront the **same** 21 decision problems as those in Block A. You will see your choice from the corresponding problem in Block A highlighted in yellow. You will be asked to consider if you would like to change you choice.

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.

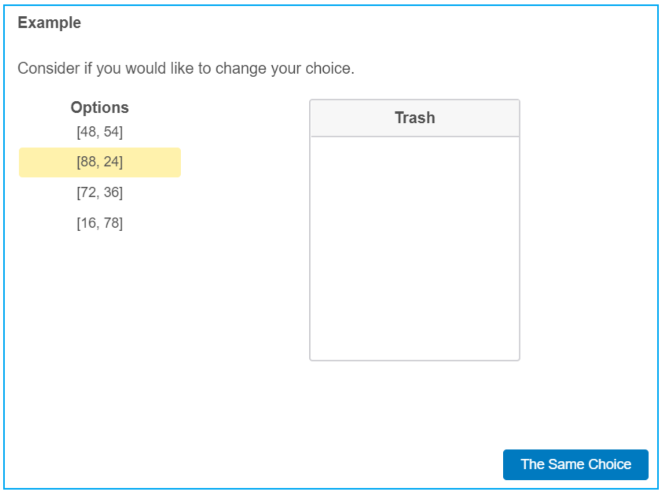
Remember that we will ask you to choose between Blocks A and B for payment at the end of Section 1.

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

B.2.2.6 Sequential Elimination (Block B)

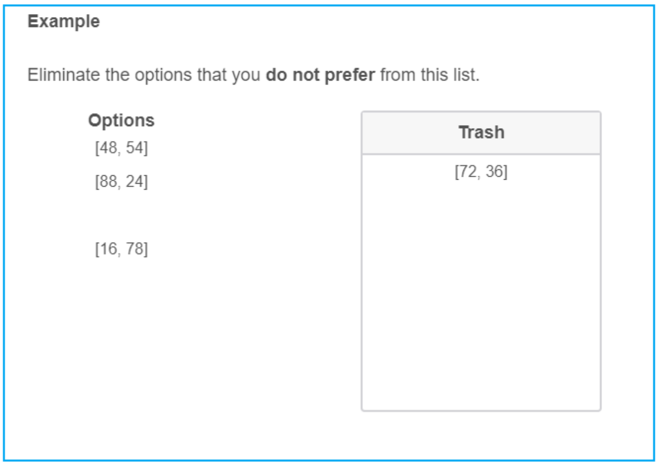
In this block, you will confront the **same** 21 decision problems as those in Block A. You will see your choice from the corresponding problem in Block A highlighted in yellow. You will be asked to consider if you would like to change you choice.

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.

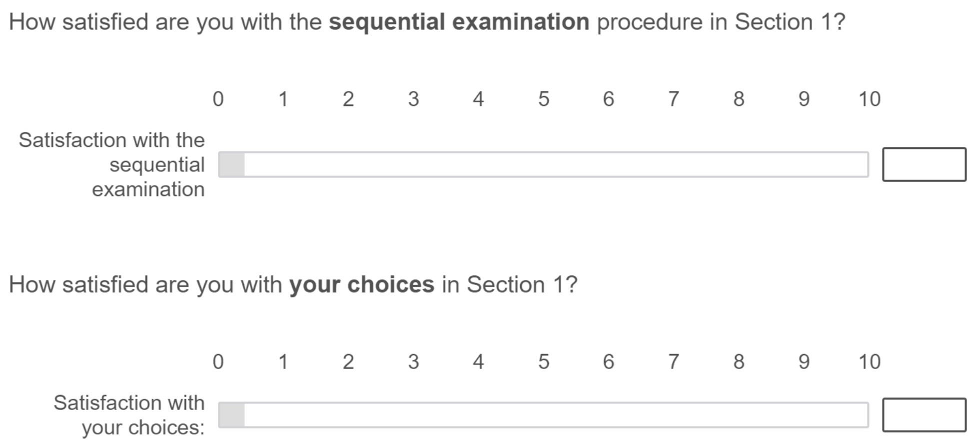
- Block A
- Block B

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.

FIGURE B.1:

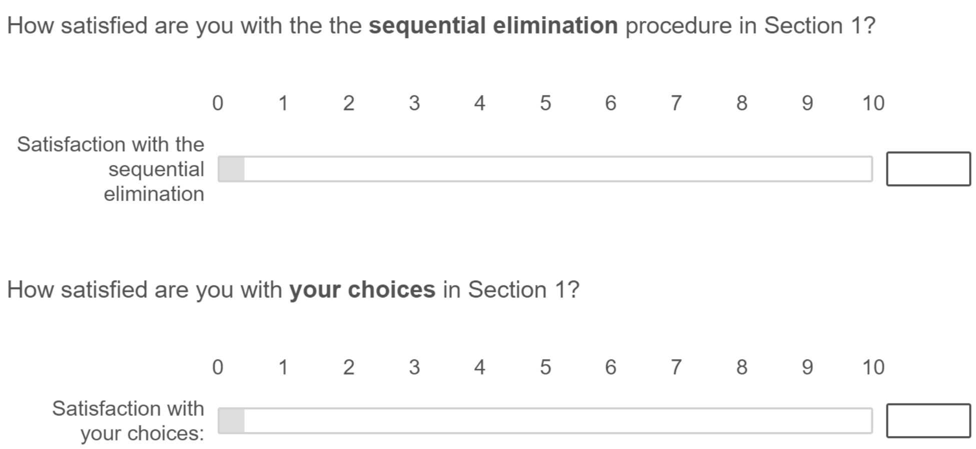


B.2.2.9 Individual Satisfaction (Sequential Elimination)

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.

FIGURE B.1:


How satisfied are you with the the **sequential elimination** procedure in Section 1?
0 1 2 3 4 5 6 7 8 9 10
Satisfaction with the sequential elimination
How satisfied are you with **your choices** in Section 1?
0 1 2 3 4 5 6 7 8 9 10
Satisfaction with your choices:

B.2.2.10 Screenshots of the Treatments

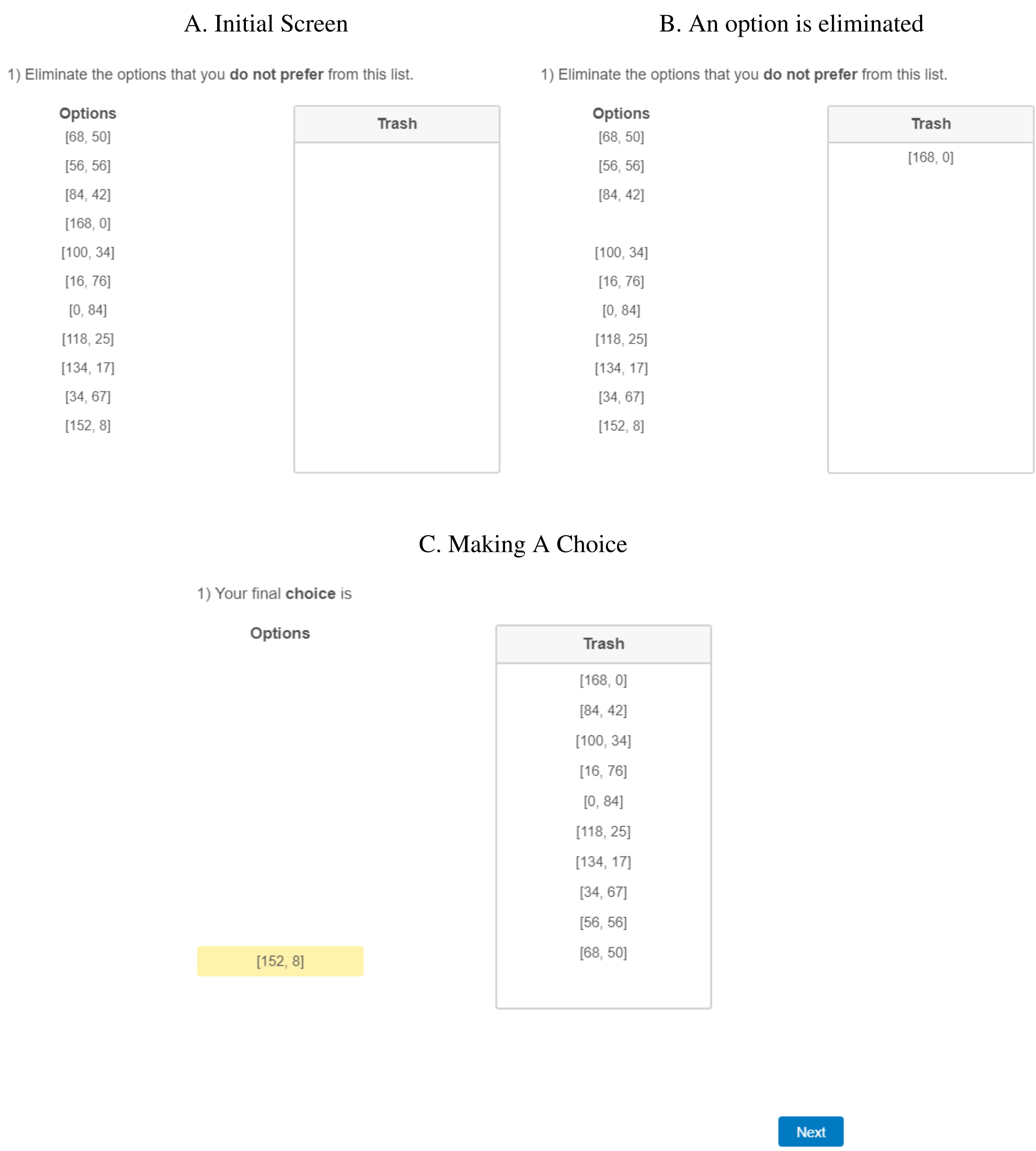


FIGURE B.2: Sequential Elimination

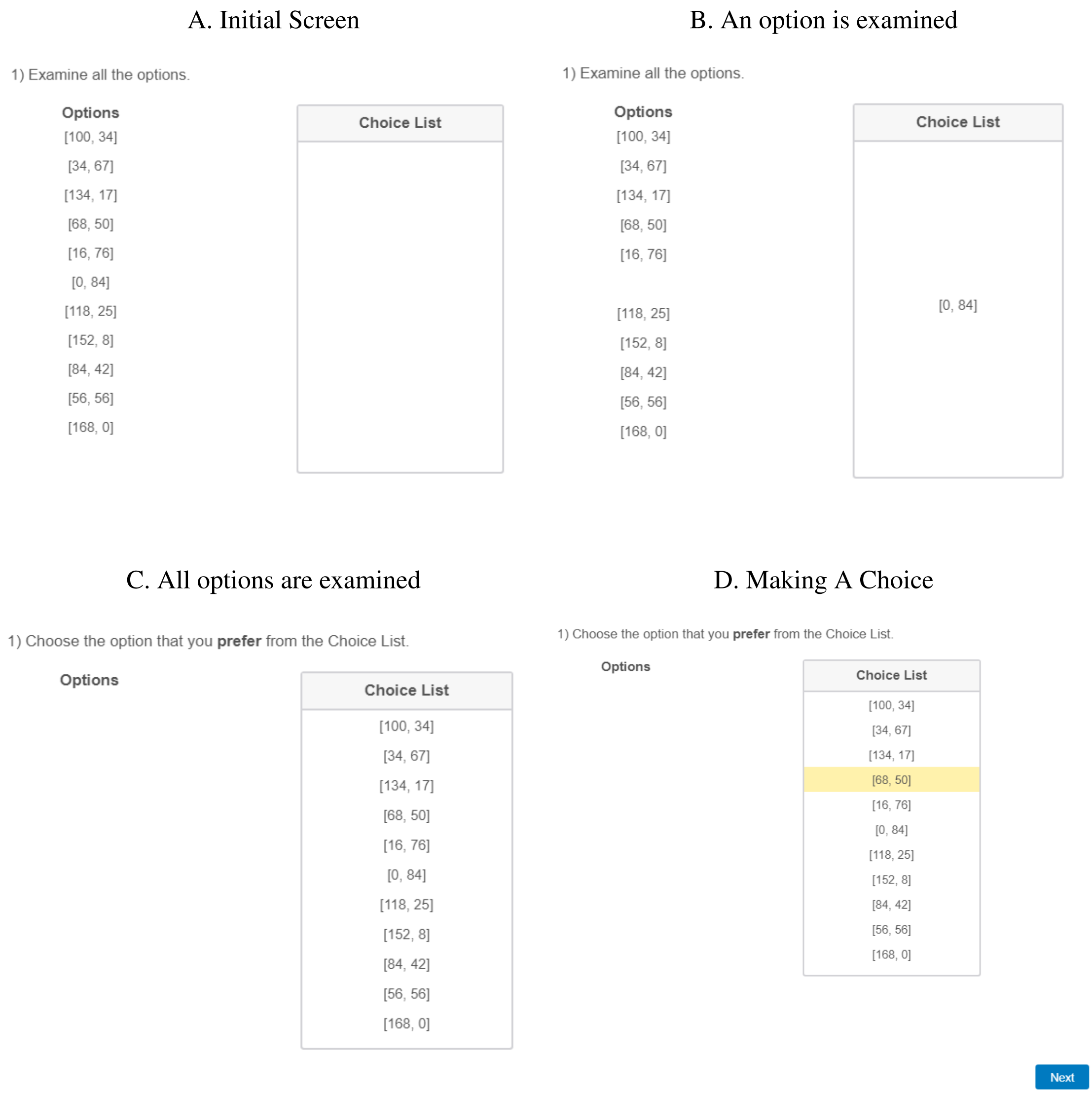


FIGURE B.3: Direct Procedure

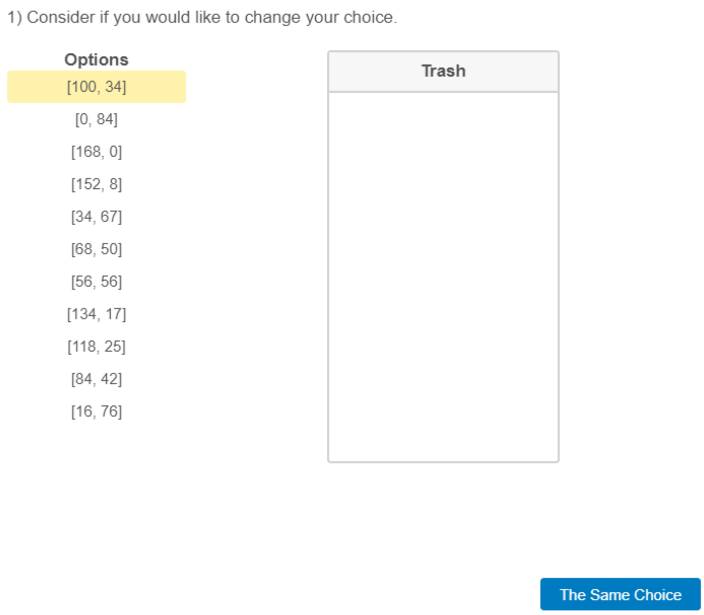


FIGURE B.4: Choice Revision

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.

B.2.3.1 Task 1: International Cognitive Ability Resource (ICAR) Test

In this task, you are asked to answer ten questions. Five of them are about matrix reasoning and the other five are about three-dimensional rotation. There is a right answer to each question. You can have at most twelve minutes in this task.

Please indicate which is the best answer to complete the figure below.

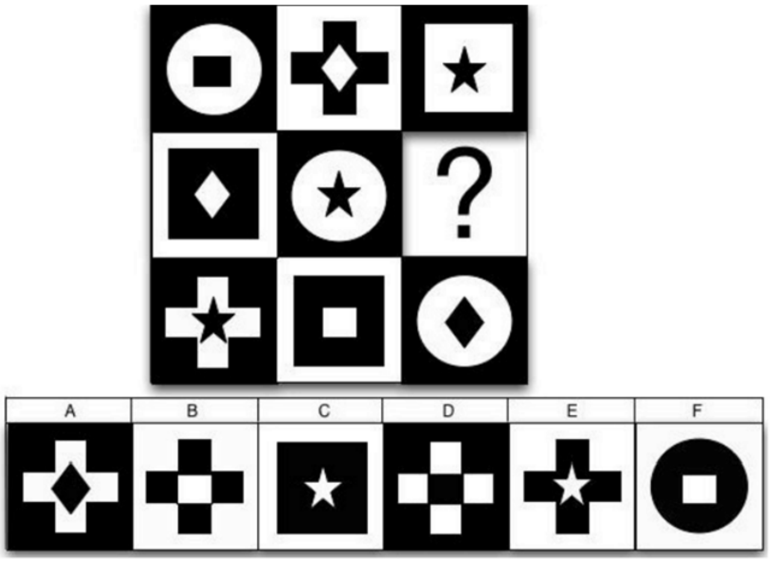


FIGURE B.5: ICAR, Matrix Reasoning Problem

Please indicate which is the best answer to complete the figure below.

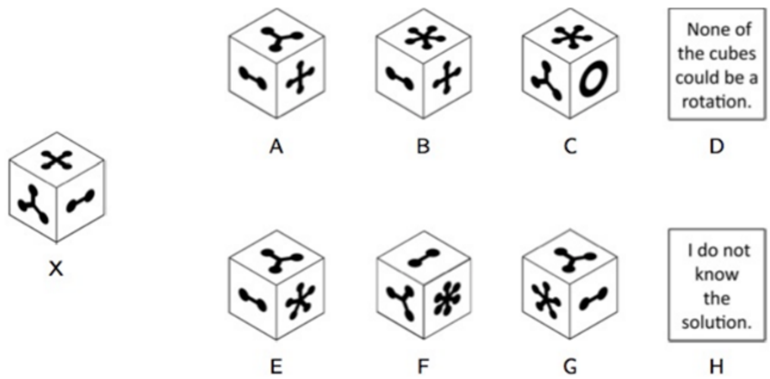


FIGURE B.6: ICAR, Three-dimensional Rotation Problem

B.2.3.2 Task 2: Stroop Task

This task measures your concentration. In each round, you are asked to **identify the color of the word shown on the screen**. The word itself is irrelevant — you can safely ignore it. To indicate the color of the word, please use the keys **r**, **g**, **b** and **o** for red, green, blue and orange, respectively. A plus sign will be shown before each word, please keep your eyes on the plus sign. You will have only two seconds in each round.

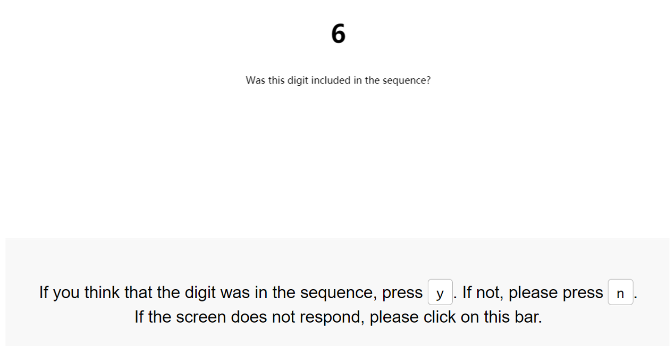
FIGURE B.7: Stroop Task

B.2.3.3 Task 3: Sternberg Task

This task measures your working memory. In each round, you are asked to memorize a sequence of digits. The length of this sequence can vary from four to eight digits. After the presentation, we will ask you to indicate whether a certain digit was included in the sequence. Please press **y** if you think that the digit was in the sequence. If not, please press **n**. If your decision is correct, you will see a green circle. Otherwise, you will see a red circle. Then we will ask you to type in the entire sequence.

A. Memorization Phase

B. Recall Phase 1



C. Recall Phase 2

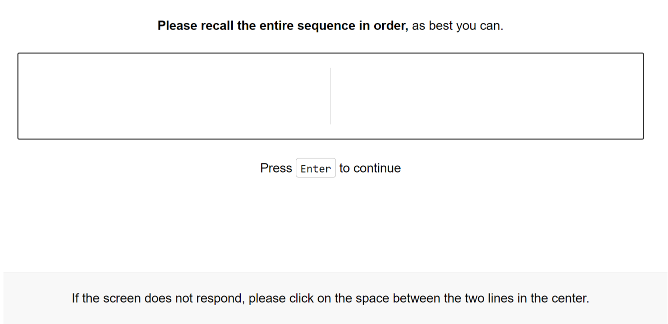


FIGURE B.8: Sternbeg Task

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 feeling.

B.2.4.1 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 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 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: Descriptive Statistics and Balance Checks

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)
Observations	75	73	75	148	150	148

Note: Standard errors are in parentheses.

TABLE C.2: Breakdown of Observations

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

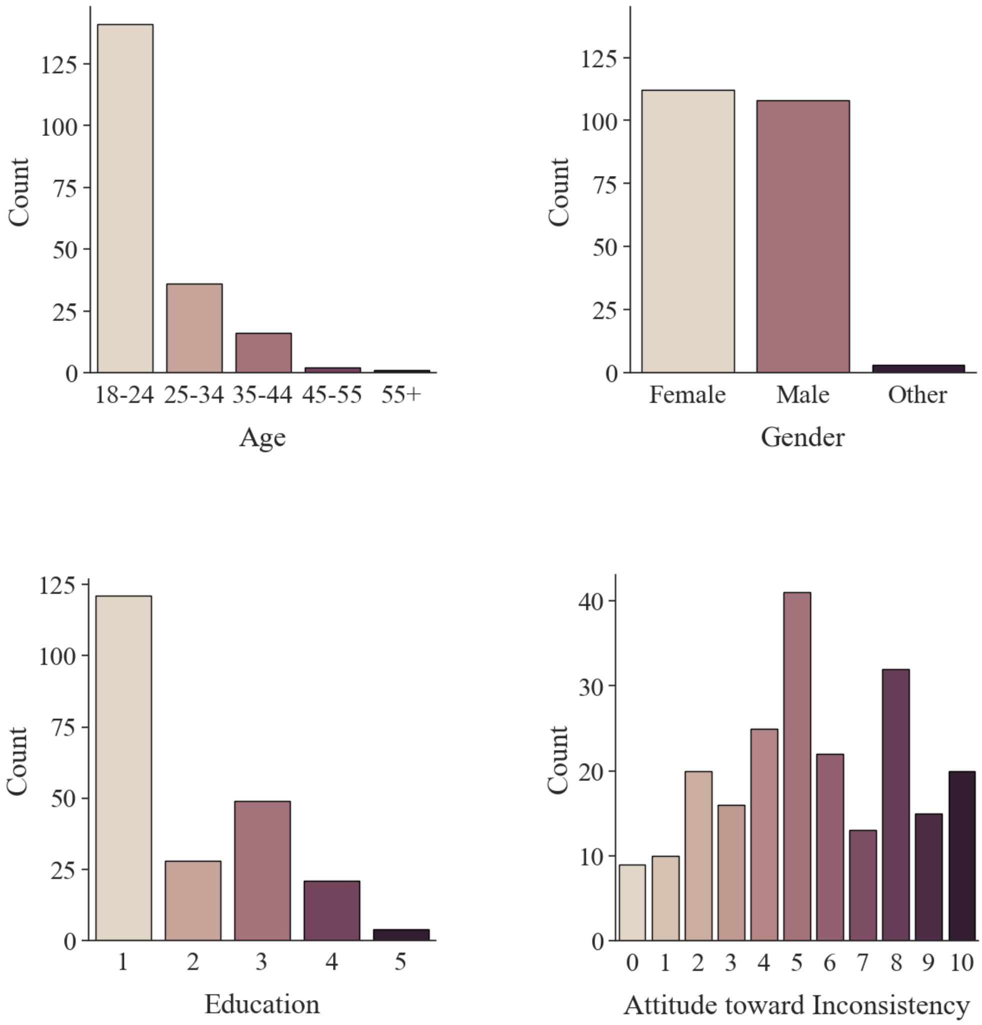


FIGURE C.1: Histograms of Demographics and Attitude toward Inconsistency

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)".

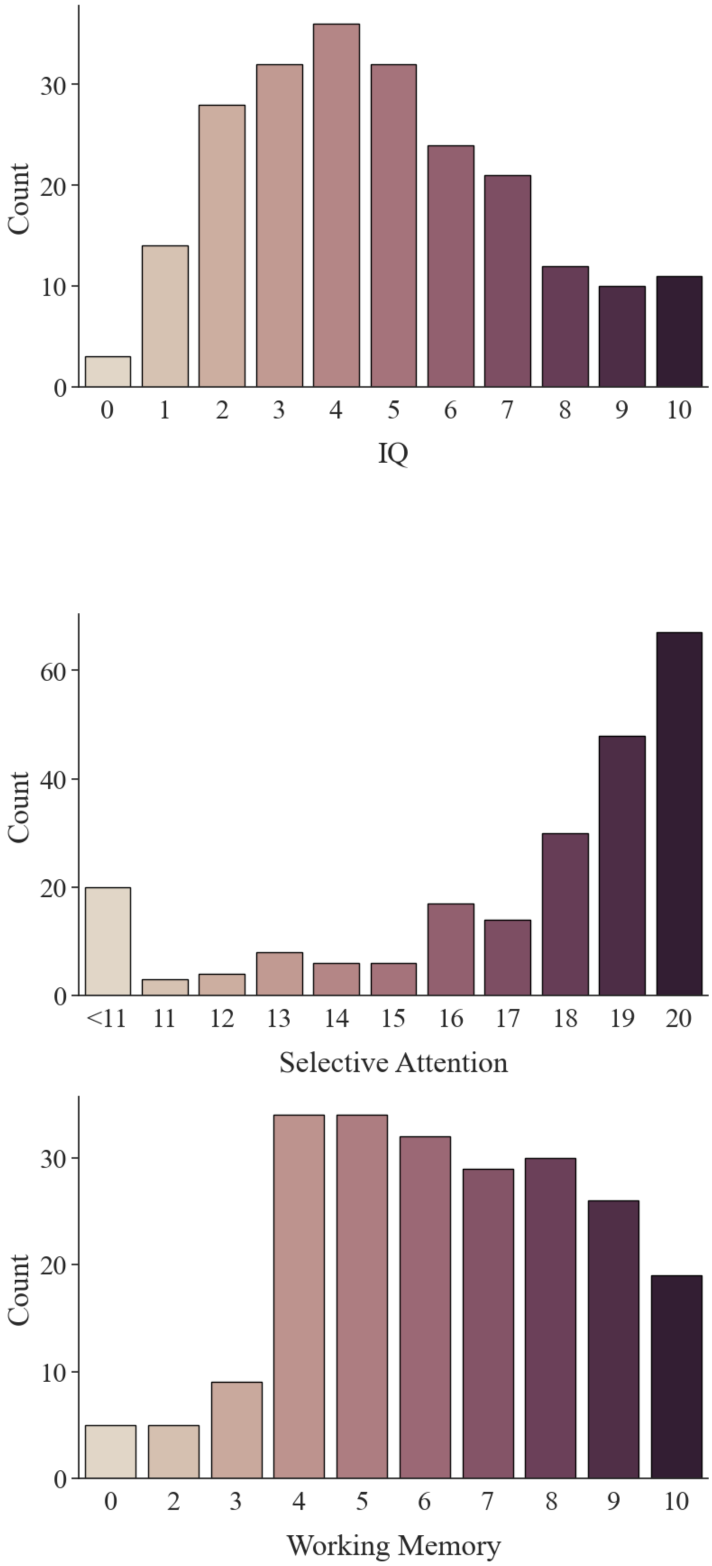


FIGURE C.2: Histograms of Cognitive Ability

D Experimental Results Details

D.1 Economic Rationality

TABLE D.1: Sequential Elimination and Cognitive Ability Interaction

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Sequential Elimination	1.688***	-2.689***	-2.424***	-1.318***	-0.054**	-0.704
	(0.494)	(0.938)	(0.865)	(0.453)	(0.024)	(0.621)
IQ	0.269***	-0.513***	-0.472***	-0.242***	-0.009***	-0.040
	(0.074)	(0.143)	(0.131)	(0.066)	(0.003)	(0.074)
Sequential Elimination × IQ	-0.297***	0.465***	0.420**	0.258***	0.009**	-0.035
	(0.094)	(0.178)	(0.165)	(0.087)	(0.004)	(0.112)
Panel B: Marginal Effects of Sequential Elimination						
All Subjects	0.110	-8.015	-7.446	-0.175	-0.009	-0.515**
	(0.075)	(5.536)	(4.786)	(0.137)	(0.010)	(0.235)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.714***	1.699***	-1.516*		0.476
		(0.161)	(0.162)	(0.830)		(0.384)
Log Likelihood	-87.595	-291.721	-311.178	-141.625	211.949	-145.406
Observations	148	148	148	148	148	148

Note: This table examines the interaction between the effect of sequential elimination and cognitive ability, as indicated by IQ scores. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for all subjects, 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. Additional 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.

TABLE D.2: Effect of Sequential Elimination on Economic Rationality (Low-IQ Subject Data)

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Sequential Elimination	0.712**	-1.199**	-1.108**	-0.545*	-0.029	-0.350
	(0.310)	(0.483)	(0.450)	(0.319)	(0.018)	(0.428)
IQ	0.088	0.244	0.218	0.024	-0.001	0.165
	(0.129)	(0.173)	(0.165)	(0.128)	(0.008)	(0.164)
Panel B: Marginal Effects of Sequential Elimination						
Low-IQ Subjects	0.252***	-13.513	-12.562	-0.398*	-0.029	-0.237
	(0.098)	(9.438)	(8.039)	(0.224)	(0.018)	(0.298)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.661***	1.625***	-0.996		0.692
		(0.216)	(0.220)	(0.759)		(0.437)
Log Likelihood	-45.987	-170.368	-180.361	-82.200	88.665	-70.432
Observations	74	74	74	74	74	74

Note: This table estimates the effect of sequential elimination on economic rationality within the low-IQ subject subsample. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for low-IQ subjects, 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. Additional 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.

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

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Sequential Elimination	0.868**	-1.699***	-1.447**	-0.916**	-0.049**	0.121
	(0.398)	(0.653)	(0.607)	(0.413)	(0.021)	(0.540)
2nd-Tercile-IQ	0.135	-0.073	0.008	-0.161	-0.033	1.220***
	(0.387)	(0.536)	(0.506)	(0.331)	(0.021)	(0.470)
3rd-Tercile-IQ	1.104***	-2.289***	-2.092***	-1.269**	-0.047**	0.112
	(0.425)	(0.728)	(0.682)	(0.502)	(0.020)	(0.451)
Sequential Elimination × 2nd-Tercile-IQ	-0.611	1.116	0.879	0.935*	0.062**	-1.620**
	(0.542)	(0.862)	(0.808)	(0.541)	(0.029)	(0.743)
Sequential Elimination × 3rd-Tercile-IQ	-1.235**	2.279**	2.013**	1.492**	0.055**	-0.778
	(0.558)	(0.969)	(0.908)	(0.667)	(0.025)	(0.724)
Panel B: Marginal Effects of Sequential Elimination						
1st-Tercile-IQ Subjects	0.316**	-9.845*	-9.332*	-0.553**	-0.049**	0.058
	(0.138)	(5.368)	(5.233)	(0.255)	(0.021)	(0.269)
2nd-Tercile-IQ Subjectss	0.097	-4.953	-5.330	0.015	0.013	-1.196**
	(0.138)	(4.762)	(4.954)	(0.275)	(0.019)	(0.562)
3rd-Tercile-IQ Subjectss	-0.113	0.959	1.147	0.202	0.006	-0.245
	(0.119)	(1.121)	(1.325)	(0.178)	(0.013)	(0.190)
All Subjects	0.095	-4.612*	-4.476*	-0.122	-0.009	-0.466**
	(0.076)	(2.605)	(2.574)	(0.137)	(0.010)	(0.213)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.682***	1.671***	-1.887*		0.275
		(0.165)	(0.165)	(1.110)		(0.348)
Log Likelihood	-88.540	-290.659	-310.220	-140.513	212.759	-140.740
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. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different IQ 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. Additional 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.

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

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Sequential Elimination	0.859**	-1.539**	-1.312**	-0.911**	-0.048**	0.145
	(0.397)	(0.619)	(0.583)	(0.409)	(0.021)	(0.544)
2nd-Quartile-IQ	0.063	0.488	0.506	-0.022	-0.021	0.664
	(0.456)	(0.581)	(0.540)	(0.379)	(0.026)	(0.610)
3rd-Quartile-IQ	0.452	-1.172**	-1.000*	-0.524	-0.050**	1.349***
	(0.407)	(0.542)	(0.526)	(0.370)	(0.020)	(0.487)
4th-Quartile-IQ	1.169**	-2.780***	-2.451***	-1.535**	-0.044**	-0.185
	(0.486)	(0.818)	(0.743)	(0.615)	(0.022)	(0.523)
Sequential Elimination × 2nd-Quartile-IQ	-0.489	0.871	0.667	0.905	0.061	-1.015
	(0.642)	(0.972)	(0.923)	(0.653)	(0.040)	(0.905)
Sequential Elimination × 3rd-Quartile-IQ	-0.784	1.188	0.970	1.061*	0.059**	-1.829**
	(0.573)	(0.842)	(0.808)	(0.571)	(0.023)	(0.768)
Sequential Elimination × 4th-Quartile-IQ	-1.327**	2.679**	2.344**	1.618**	0.051*	-0.600
	(0.623)	(1.101)	(1.009)	(0.761)	(0.027)	(0.811)
Panel B: Marginal Effects of Sequential Elimination						
1st-Quartile-IQ Subjects	0.313**	-9.009*	-8.415*	-0.555**	-0.048**	0.070
	(0.138)	(4.622)	(4.585)	(0.253)	(0.021)	(0.274)
2nd-Quartile-IQ Subjectss	0.140	-9.102	-9.079	-0.005	0.012	-0.510
	(0.189)	(10.598)	(10.112)	(0.457)	(0.033)	(0.504)
3rd-Quartile-IQ Subjectss	0.028	-1.051	-1.228	0.089	0.011	-1.420**
	(0.152)	(1.760)	(2.036)	(0.239)	(0.010)	(0.654)
4th-Quartile-IQ Subjectss	-0.143	1.512	1.791	0.205	0.003	-0.137
	(0.143)	(1.188)	(1.496)	(0.172)	(0.016)	(0.194)
All Subjects	0.098	-4.265*	-4.086*	-0.121	-0.010	-0.429**
	(0.076)	(2.540)	(2.480)	(0.136)	(0.010)	(0.197)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.634***	1.639***	-2.104		0.242
		(0.169)	(0.168)	(1.303)		(0.361)
Log Likelihood	-89.582	-288.939	-309.062	-140.240	213.983	-139.948
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. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Sequential Elimination for different IQ 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. Additional 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.

D.2 Individual Behaviors during the Choice Procedures

This section examines whether individual behaviors may differ in the Direct Procedure and Sequential Elimination. To this end, I focus on the orders in which options represented by their presentation orders in the decision problems are eliminated (examined, respectively) in Sequential Elimination (the Direct Procedure, respectively), referred to as *elimination orders* (*examination orders*, respectively). For example, an elimination order (examination order, respectively) of [3,1,2,10,9,5,6,8,11,4,7] indicates that a subject sequentially eliminates (examines, respectively) the third, first,..., and seventh options in a decision problem under Sequential Elimination (the Direct Procedure, respectively). I assess the relationship between these orders in different treatment and cognitive groups using Spearman's and Kendall's rank correlation coefficients.

Table D.5 presents the results. The top three rows show that the (median and mean) examination orders of the group significantly correlate with the presentation orders ($p < 0.001$) in the Direct Procedure, and this remains true for both low- and high-IQ subjects. This suggests that subjects tend to examine options sequentially following presentation orders under the Direct Procedure, regardless of their cognitive ability. The same table, on the other hand, indicates that the relationship between presentation orders and elimination behavior under Sequential Elimination is much less considerable in terms of magnitude and statistical significance.

Does there exist a presentation order effect on individual choices that can account for the difference in economic rationality between the Direct Procedure and Sequential Elimination? This question is examined by Table D.6, which shows no significant difference in the presentation positions of the choices between the two choice procedures.

TABLE D.5: Correlations between Choice Behavioral and Presentation Orders

	Spearman's Coefficient		Kendall's Coefficient	
	(1)	(2)	(3)	(4)
Panel A: Examination and Presentation Orders				
Low-IQ Subjects	1.0	0.995	1.0	0.982
	(<0.001)	(<0.001)	(<0.001)	(<0.001)
High-IQ Subjects	1.0	0.995	1.0	0.982
	(<0.001)	(<0.001)	(<0.001)	(<0.001)
All Subjects	1.0	0.995	1.0	0.982
	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Panel B: Elimination and Presentation Orders				
Low-IQ Subjects	0.528	0.5	0.446	0.426
	(0.095)	(0.117)	(0.082)	(0.114)
High-IQ Subjects	-0.046	0.5	-0.078	0.426
	(0.893)	(0.117)	(0.764)	(0.114)
All Subjects	0.472	0.5	0.402	0.426
	(0.143)	(0.117)	(0.128)	(0.114)

Note: This table displays the correlations between the sequences of examined or eliminated options relative to their presentation orders across different subject groups, as measured by Spearman's and Kendall's rank coefficients. Columns 1 and 3 show the coefficients derived from median orders, calculated for each decision problem at the group level, while Columns 2 and 4 present those based on mean orders, rounded to the nearest integer. p-values are provided in parentheses.

TABLE D.6: Difference in Choice Presentation Positions between Treatments

	Mann-Whitney U Test Statistic
Low-IQ Subjects	714.5
	(0.712)
High-IQ Subjects	584.5
	(0.319)
All Subjects	2604.5
	(0.611)

Note: This table examines the difference in the presentation positions of choices between the Direct Procedure and Sequential Elimination for different subject groups, using the Mann-Whitney U Tests. p-values are provided in parentheses.

D.3 Procedure Preference

TABLE D.7: Impacts of Procedure Preference on Economic Rationality in IQ Groups

	Direct Procedure Selected vs. Assigned, High-IQ Subjects		Procedure Preference vs. Direct Procedure, Low-IQ Subjects	
	Full Consistency (1)	GARP Violations (2)	Full Consistency (3)	GARP Violations (4)
Panel A: Regression Coefficients				
Procedure Preference	-0.814*	1.416***	0.678**	-0.695
	(0.433)	(0.486)	(0.310)	(0.449)
IQ	0.464***	-0.860***	0.087	-0.041
	(0.147)	(0.188)	(0.142)	(0.161)
Panel A: Marginal Effects of Procedure Preference				
All Subjects	-0.234**	9.055	0.254**	-6.591
	(0.116)	(5.574)	(0.112)	(4.926)
Additional Controls	Yes	Yes	Yes	Yes
Log Alpha		1.340***		1.749***
		(0.310)		(0.215)
Log Likelihood	-30.343	-103.997	-45.969	-180.555
Observations	60	60	73	73

Note: This table estimates the impacts of procedure preference on economic rationality, focusing on specific IQ and treatment groups. The first two columns (1 and 2) compare the economic rationality of high-IQ subjects who select the Direct Procedure in the Procedure Preference treatment (*the Direct Procedure selected*) with those assigned to it (*the Direct Procedure assigned*). The last two columns (3 and 4) examine the economic rationality of low-IQ subjects in the Procedure Preference treatment relative to the Direct Procedure treatment. For each pair, the first column (1 and 3) presents probit regression results for full consistency, while the second column (2 and 4) displays negative binomial regression results for GARP violations. Panel A details the regression coefficients. Panel B elucidates the marginal effects of Procedure Preference for different IQ 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. Additional 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.

D.4 Alternative Choice Procedure

TABLE D.8: Choice Revision and Economic Rationality (Sequential Elimination Data)

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Revision	-0.167	0.180	0.210	0.071	0.001	-0.511
	(0.353)	(0.218)	(0.217)	(0.243)	(0.011)	(0.484)
High-IQ	-0.380	-0.886	-0.801	0.002	-0.017	-0.815
	(0.464)	(0.839)	(0.853)	(0.449)	(0.019)	(0.792)
Revision $\times$ High-IQ	0.647	-0.902*	-1.014**	-0.438	-0.005	0.223
	(0.434)	(0.511)	(0.516)	(0.346)	(0.012)	(0.565)
Panel B: Marginal Effects of Revision						
Low-IQ Subjects	-0.038	3.695	5.093	0.047	0.001	-0.162
	(0.079)	(5.011)	(6.270)	(0.155)	(0.011)	(0.169)
High-IQ Subjects	0.109*	-3.972	-5.409	-0.196	-0.004	-0.045
	(0.062)	(4.017)	(5.778)	(0.119)	(0.004)	(0.047)
All Subjects	0.026	-0.135	-0.371	-0.060	-0.001	-0.106
	(0.053)	(3.639)	(4.916)	(0.102)	(0.006)	(0.087)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.599***	1.603***	-1.064		-13.672
		(0.249)	(0.257)	(0.868)		(9.452)
Log Likelihood	-37.825	-161.277	-168.040	-76.486	130.720	-41.318
Observations	94	94	94	94	94	94

Note: This table estimates the impacts of choice revision on economic rationality within Sequential Elimination. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of choice revision for different IQ groups, indicating the average change in the dependent variables upon switching from initial to revised choices across observations. All models include a constant term. Additional 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.

TABLE D.9: Choice Revision and Economic Rationality (Aggregate Data)

	Full Consistency (1)	GARP Violations (2)	SARP Violations (3)	HM Index (4)	CCEI (5)	FOSD Violations (6)
Panel A: Regression Coefficients						
Revision	-0.248	-0.348	-0.336	0.014	-0.008	0.571***
	(0.320)	(0.237)	(0.247)	(0.250)	(0.016)	(0.198)
High-IQ	0.676*	-2.049***	-1.874***	-1.044**	-0.033	1.156**
	(0.401)	(0.585)	(0.568)	(0.419)	(0.021)	(0.520)
Revision × High-IQ	0.356	0.769	0.710	0.106	0.002	-0.917***
	(0.432)	(0.563)	(0.524)	(0.437)	(0.018)	(0.346)
Sequential Elimination	0.625	-0.953	-0.978	-0.546	-0.010	0.129
	(0.395)	(0.613)	(0.610)	(0.411)	(0.028)	(0.533)
Revision × Sequential Elimination	0.139	0.658**	0.673**	0.094	0.009	-1.053**
	(0.412)	(0.327)	(0.343)	(0.338)	(0.019)	(0.479)
High-IQ × Sequential Elimination	-0.919*	1.059	1.037	1.105*	0.018	-1.908**
	(0.549)	(0.803)	(0.785)	(0.610)	(0.029)	(0.809)
Revision × Sequential Elimination × High-IQ	0.044	-1.233*	-1.222**	-0.567	-0.006	1.116*
	(0.540)	(0.642)	(0.609)	(0.543)	(0.021)	(0.631)
Panel B: Marginal Effects of Revision						
Low-IQ Subjects	-0.065	-1.285	-1.152	0.039	-0.003	0.065
	(0.073)	(2.434)	(2.605)	(0.142)	(0.010)	(0.094)
Under the Direct Procedure	-0.091	-5.256	-5.362	0.014	-0.008	0.262**
	(0.116)	(4.503)	(4.874)	(0.249)	(0.016)	(0.133)
Under Sequential Elimination	-0.037	2.499	2.828	0.065	0.001	-0.148
	(0.088)	(2.090)	(2.278)	(0.134)	(0.011)	(0.143)
High-IQ Subjects	0.066	0.400	0.381	-0.068	-0.005	-0.186
	(0.057)	(0.851)	(0.922)	(0.089)	(0.004)	(0.146)
Under the Direct Procedure	0.034	1.205	1.304	0.044	-0.006	-0.316
	(0.091)	(1.703)	(1.841)	(0.136)	(0.007)	(0.275)
Under Sequential Elimination	0.100	-0.366	-0.492	-0.182	-0.004	-0.045
	(0.067)	(0.427)	(0.502)	(0.115)	(0.004)	(0.044)
All Subjects	0.003	-0.484	-0.359	-0.004	-0.004	-0.087
	(0.046)	(1.468)	(1.511)	(0.081)	(0.005)	(0.096)
Under the Direct Procedure	-0.026	-2.371	-2.336	0.029	-0.007	-0.042
	(0.073)	(2.713)	(2.869)	(0.144)	(0.009)	(0.156)
Under Sequential Elimination	0.034	1.219	1.321	-0.056	-0.001	-0.094
	(0.055)	(1.189)	(1.276)	(0.087)	(0.006)	(0.071)
Additional Controls	Yes	Yes	Yes	Yes	Yes	Yes
Log Alpha		1.826***	1.834***	-0.766		0.281
		(0.172)	(0.177)	(0.576)		(0.420)
Log Likelihood	-112.467	-357.749	-378.884	-186.462	275.651	-162.137
Observations	190	190	190	190	190	190

Note: This table estimates the impacts of choice revision on economic rationality for subjects from both the Direct Procedure and Sequential Elimination, accounting for its interaction with the choice procedures and cognitive ability. Column 1 presents probit regression results for full consistency. Columns 2 to 4 and 6 display negative binomial regression results for GARP violations, SARP violations, HM index, and FOSD violations, respectively. Column 5 provides ordinary least squares regression results for CCEI. Panel A details the regression coefficients. Panel B elucidates the marginal effects of choice revision for different IQ groups, indicating the average change in the dependent variables upon switching from initial to revised choices across observations. All models include a constant term. Additional 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.