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THESIS

USING BEHAVIORAL ECONOMICS CONCEPTS TO IMPROVE DECISION-MAKING IN THE NAVY PLANNING, PROGRAMMING, BUDGETING, AND EXECUTION PROCESS

by

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December 2023

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The purpose of this study is to identify potential systematic cognitive biases that may be present in the programming phase of the Navy's Planning, Programming, Budgeting, and Execution (PPBE) enterprise to inform civilian and military decision-makers involved in the financial management processes and provide recommendations to improve the process in which choices are made regarding Navy financial decisions. The analysis framework is based on behavioral economics (BE) concepts that diverge from traditional economics by incorporating psychological and social influences into explaining economic-based choices. Using behavioral economics to examine the choice mechanisms used by Navy financial programmers provides the basis for recommendations on educating and informing the same programmers on how to make more efficient decisions.

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LIST OF ACRONYMS AND ABBREVIATIONS

BE	Behavioral Economics
CR	Continuing Resolution
DOD	Department of Defense
DPG	Defense Programming Guidance
FY	Fiscal Year
FYDP	Future Years Defense Plan
JCIDS	Joint Capabilities Integration and Development System
JROC	Joint Requirements Oversight Council
LCS	Littoral Combat Ship
NDAA	National Defense Authorization Act
OSD	Office of the Secretary of Defense
PB	Proposed Budget
POM	Program Objective Memorandum
PPBE	Planning, Programming, Budgeting, and Execution
PPBS	Planning, Programming, and Budgeting System

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EXECUTIVE SUMMARY

Behavioral economics (BE) can improve the Navy's Planning, Programming, Budgeting, and Execution (PPBE) process. The PPBE process is a complex and vital system that allocates resources to the Navy's various programs. Still, it is vulnerable to inefficiencies and biases, specifically in formulating the Program Objective Memorandum (POM).

There have been many improvements to the PPBE process since its inception in the 1960s, including the recent Commission on PPBE Reform, which is due to release its final report in January 2024 (Commission on PPBE Reform, 2023). Little research, however, focuses on improving PPBE utilizing behavioral economics.

BE concepts can help to identify and mitigate suboptimal decision-making influences, leading to a more efficient use of resources. Specifically, loss aversion, as identified by Kahneman and Tversky in their seminal work *Prospect Theory: An Analysis of Decision Under Risk,* purports that it is more psychologically painful to lose something than gain an equivalent value (Kahneman & Tversky, 1979). This can help understand financial decision-making in developing defense budgets and the POM; even though specific programs may not provide as much utility as others, it would be psychologically unpalatable to reduce a program and lose budget authority than it would be to gain a new program of equal budget authority.

Other concepts, like heuristics and their associated biases, help explain how people make choices. Programmers may be influenced by anchoring bias from the FYDP. The FYDP serves as a baseline to develop the following year's POM. Though circumstances for the future may have changed, the FYDP can significantly impact the POM in development solely because it is the starting point for POM development. Availability bias can lead to the tendency to allow the most readily available information to influence decisions. Programmers who worked on a previous year's POM may be influenced in formulating the future POM by the available information they recall more readily than by circumstances that require new analysis, thus leading to a potentially less optimal POM.

Finally, Defense Programming Guidance (DPG) is critical in informing programmers on prioritizing programs for inclusion in the POM. Unfortunately, the delayed release of DPG can negatively impact the POM. If programmers must make late-stage adjustments to their POM, cognitive biases can have an exasperated impact on their decisions, leading to suboptimal decision-making. The requirement to rely on DPG to inform decision-making represents the choice architecture on the systematic formulation of the POM.

A training or instruction program that exposes decision-makers to BE concepts is crucial to counteract the negative impacts of cognitive biases in developing the Program Objective Memorandum and decision-making in the PPBE process. Programmers must be cognizant of the inherent nature of cognitive biases that can influence their decision-making and learn how to recognize and counteract their influence. Likewise, authorities that develop DPG must ensure a timely release of the guidance, even in the face of continuing resolutions and late passage of budget bills. Otherwise, they increase the likelihood of a POM negatively influenced by cognitive biases.

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I. INTRODUCTION

This thesis aims to identify systematic and suboptimal human decision biases in the Navy's Planning, Programming, Budgeting, and Execution (PPBE) process and accordingly make recommendations for improvement. Specifically, the study focuses on formulating the Program Objective Memorandum (POM); POM is essential in allocating the Navy's financial resources. It serves as a resource guide and a priority statement over five years (Blickstein et al., 2016, p. 10). The analysis of this thesis is focused on and deeply rooted in behavioral economics (BE). Behavioral economics deviates from mainstream rational economics by incorporating psychology and social sciences to explain human decision-making.

Identifying potential systematic behavioral biases in the POM process is of critical importance. Because of the significant implications the POM has on national security, the capabilities of the United States Navy, and ensuring the most efficient application of taxpayer dollars, any improvement to the allocation of federal resources is strategically and economically meaningful. Considering Fiscal Year 2023 (FY23) alone, The Navy's portion of the requested FY23 Federal Budget amounted to almost $231 billion, ensuring optimal fiscal decisions is essential (Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer, 2022, p. 6-9). Current PPBE practices regarding POM formulation fail to incorporate many common applications of economic theory and largely exclude any behavioral economics practices, creating the potential for improved decision-making if the theories of BE are incorporated.

The PPBE process is a unique method for making resourcing decisions that incorporate robust analysis and various reviews; the formulation of the POM is a key product of the process. The POM details and prioritizes how the Navy will allocate its financial resources over the following years (Blickstein et al., 2016, p. 5). PPBE is very detailed and systematically allocates resources to link strategy and plans to a set of programs that will achieve the desired strategy within fiscal limitations (Candreva, 2017, p. 209). Ultimately, all decisions, at every level, within the system are made by people. The PPBE process begins with the Planning phase, which relies on guidance from the highest

levels of government, like the White House, the Secretary of Defense, Congress, and the Secretary of the Navy. Their guidance delineates policy and priorities and is published in documents like the *National Security Strategy* and *National Defense Strategy*, collectively called defense planning guidance (DPG). Navy planners set a general priority of resources, relating them to DPG so more detailed programming of resources can occur. Following the Planning phase is the Programming phase. Programming identifies the resources that will be available, prioritizes needs across the Future Years Defense Program (FYDP), and then marks them for inclusion in the POM (Blickstein et al., 2016, p.10). Once the POM is finalized, Budgeting occurs in which the fiscal branch of the Navy makes specific resource allocations to the programs as they have been prioritized in the POM. This phase of the PPBE process is more detailed than the Planning or Programming in that it assigns specific dollar amounts to programs within the fiscal constraints to be presented in the proposed President's Budget to Congress. The final phase of the PPBE process is execution. The execution phase not only allocates fiscal resources to the various programs once Congress has appropriated resources but also monitors the usage of funds to ensure programs expend them as planned (Blickstein et al., 2016, p.12).

Throughout the PPBE process, decision-makers try to make the best possible choices using the planning guidance to inform their decisions. Behavioral Economics is ideal for examining how decisions are made within PPBE because the field has long studied human decision-making, specifically financial decision-making, and identified many common biases that unintentionally influence people's choices. Biases identified by BE are anchoring, availability bias, representativeness, and status quo bias, among others (Thaler. pp.26-40). Likewise, the way choices are presented, called choice architecture, plays a significant role in decision-making. Awareness of the concepts and biases identified throughout behavioral economics can help personnel involved in the PPBE process guard against their influences and thus make more optimal decisions.

Various elements in the Planning and Programming phases of PPBE are vulnerable to systematic biases. The starting point for developing a POM is the previous year's congressionally approved budget, thus increasing the likelihood of anchoring bias dominating the decision-making process based on the Future Years Defense Program.

Other biases like representativeness, availability, and status quo create potential inefficiencies in the POM formulation, which can lead to suboptimal decision-making in the POM development and, ultimately, a less efficient allocation of a limited budget.

To help planners involved in formulating the Navy POM, they must become knowledgeable of the influence biases recognized in behavioral economics may have on their decisions. Instruction on biases derived from modern academic literature in Behavioral Economics should be included in familiarization training for new financial management personnel building the POM. Knowledge alone, however, is insufficient to prevent bias; planners must take intentional action to prevent the influence of biases and make more optimal decisions. Likewise, the reliance on Defense Planning Guidance to inform programmers in their development of the POM must be released on time to incorporate it from the early stages in the formulation of the POM.

The research and recommendations in this thesis are meant to be specific to the Navy PPBE process, including the formulation of a POM and the personnel who operate and make decisions within it. It is limited to the unclassified level in which the research was conducted. A large portion of planning guidance and decisions reside at the secret level, thus restricting the available information that was analyzed. Future research should be conducted at the classified level to provide more specific guidance to the Navy financial management community.

The remainder of this thesis is organized as follows: Chapter two provides background on how financial decisions are made within the Navy, Department of Defense (DOD) and are included in the President's proposed budget (PB) to Congress. Chapter three will review current and historical literature on behavioral economics to introduce biases and other concepts. Chapter four will then analyze the PPBE process through a behavioral economics lens to identify potential sources of systematic bias and present findings. Finally, Chapter five will provide recommendations for Navy planners to mitigate the influence of such biases.

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II. BACKGROUND

A. LEGISLATIVE OVERSIGHT AND AUTHORITY

Legislative fiscal control plays a critical role in the PPBE process. Congress has the power to authorize and appropriate funding for the DOD, and it exercises this power through various mechanisms, including the annual National Defense Authorization Act (NDAA) and appropriations bills. Congress also holds hearings and conducts investigations to oversee the DOD's budget execution. The congressional control of authorizations and appropriations is important for many reasons. It helps ensure that the DOD is accountable to the American people for using taxpayer dollars. It also helps to ensure that the DOD's budget is aligned with the nation's strategic priorities.

The legislative authority for authorizing and appropriating is drawn from the constitution of the United States, which confers specific powers and limits upon its Congress, notably Section 9 of Article I, which states, "No money shall be drawn from the Treasury, but in Consequence of Appropriations made by Law: and a regular Statement and Account of the Receipts and Expenditures of all public Money shall be published from time to time." The effect of this mandate is that Congress must pass an appropriations bill for any expenditure of government money; this applies to all federal entities, including the Department of Defense and the Navy, through the NDAA (Candreva, 2017, p.92).

Before Congress can pass the annual NDAA, the President submits a proposed budget (PB) detailing the federal government's planned expenditures for the fiscal year, including National Defense. The PB provides Congress a starting point to debate and modify via the legislative process. The product is multiple bills voted on to become law, including the NDAA. Specific to providing for America's defense, the NDAA serves numerous purposes: it authorizes the programs under the act's purview to receive appropriations, and it states the dollar amount of appropriations individual programs or agencies will receive to use for specific obligations or expenditures. Essentially, authorization allows the program to exist, and appropriations enable it to be funded (Candreva, 2017, p.103).

B. PRESIDENT'S BUDGET AND PPBE

To build the National Defense portion of the President's Budget proposed to Congress, the executive branch employs the PPBE process. The DOD portion of the PB and PPBE implementation is overseen by the Office of the Secretary of Defense (OSD) at large. Still, each military service employs its own approach to the PPBE process (Candreva, 2017, p. 215). PPBE traces its roots to Robert McNamara, Secretary of Defense, during the presidencies of John F. Kennedy and Lyndon B. Johnson. Secretary McNamara implemented the process to create a comprehensive, rationalized approach for budgeting, developing, and defending service needs and procurement activity. The needs of military services are generally referred to as requirements. Some requirements are developed in coordination between Component Commanders or the Joint Requirements Oversight Council (JROC), which operates in a separate process linked to PPBE called the Joint Capabilities Integration and Development System (JCIDS). JCIDS aims to identify capability gaps that need to be filled to achieve policy objectives or strategies in the near term and far into the future and make them requirements. PPBE incorporates the identified requirements from JCIDS and allocates resources to them, converting them from requirements into assets (Blickstein et al., 2016, pp.7-8). The JCIDS process, however, does not develop all requirements or needs. JCIDS is primarily concerned with capabilities such as mission sets, not fiscal-based needs like military pay, fuel costs, or other service-specific needs; thus, JCIDS only provides a portion of the requirements considered in the PPBE process. Each service uses PPBE to compile all its requirements, prioritize them, and ultimately produce a POM at the end of the programming phase. Each service's POM is then forwarded to OSD for review, modification, approval, and, ultimately, to contribute to the DOD portion of the President's Budget before submission to Congress.

C. PPBE APPROACH BY THE U.S. NAVY

The Navy's employment of the PPBE process aims to integrate goals, objectives (including requirements from JCIDS), policy, programmatic, and budgetary guidance to produce a plan for how the service will make fiscal choices for the upcoming years (Office of the Secretary of the Navy, 2021, p.1). There are four sequential phases for any fiscal

year, and the process is iterative, with a phase for one fiscal year overlapping the next phase for the prior fiscal year. For example, in Fiscal Year 2022 (FY22), the execution phase will be concerned with FY21 and FY22, the Budgeting phase will be concerned with FY23, the Programming phase will be concerned with FY24, and the Planning phase FY25. The FYDP is a five-year outlook created by collectively incorporating each phase of a given FY. The central document developed from the PPBE process is the POM, which details a prioritized list of the Navy's requirements over the FYDP and the rationale of the decision-making that informed it (Blickstein et al., 2016, pp. 8–10). A visual representation of the process and phases is seen in Figure 1.

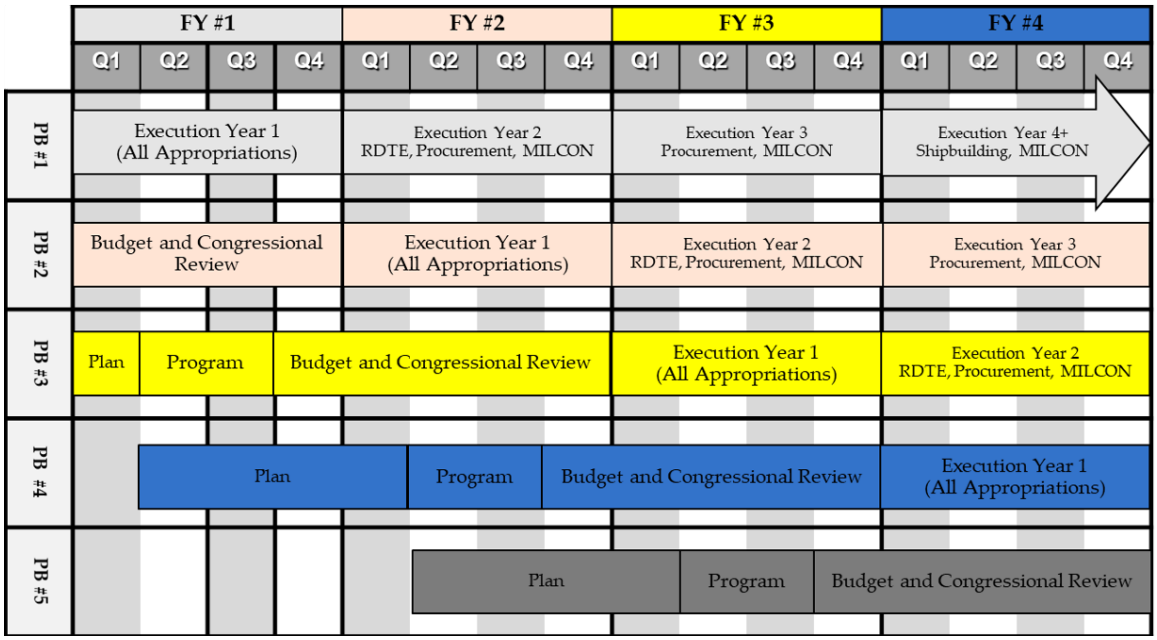

Figure 1. DON PPBE Process.
Source: Office of the Secretary of the Navy, 2021.

Most of the Navy's PPBE process is conducted by the Office of the Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8) and their staff, including a Programming Division (N80) that builds and defends the POM (Blickstein et al., 2016, pp. 37–38).

D. A NEW OPPORTUNITY FOR PPBE IMPROVEMENT

Throughout the existence of the United States Military, the government needed funding to provide a suitable, capable defense force. In 1794, President George Washington convinced Congress to provide for the acquisition of ships to construct a navy that would protect American commerce ships from the Barbary Pirates of North Africa. Congress, in turn, directed Secretary of War Henry Knox to procure six vessels but made specific demands on the ships' capabilities. The authorizing legislation mandated that four ships have 36 guns and two ships with 44 guns, set the manning levels for officers and enlisted men, and determined their compensation (Hone, 2016, p. 384). It was essentially the first comprehensive defense authorization for the Navy, which addressed many of the same issues today's NDAA does: acquisition, operations and maintenance, and pay.

When Congress bestowed the procurement tasks on Secretary Knox, they set a precedent; through the executive branch, the Department of Defense would conduct its own acquisitions, budget its finances within the appropriation provided by the legislative branch, and comply with restrictions they put in place. The budgetary process within the War Department, now DOD, evolved throughout time, but the relationship between Congress and DOD remained essentially the same. There are many instances of either Congress or DOD directing improvements to the process, mainly with the aims of increasing efficiency or consolidating the acquisitions process to focus on capabilities that could be used across the branches of the military, a concept commonly referred to as "joint" (Bartels, 2022, pp. 5–6).

E. PPBE REFORM

In 1961, the Planning, Programming, and Budgeting System (PPBS) was established to allow the Secretary of Defense (SECDEF) to make more informed and comprehensive resourcing decisions for the Department of Defense, specifically regarding force structure, major acquisitions, funding, and personnel requirements. This consolidated the budgeting system of all military services into one inclusive budget presented by the DOD to the president. The PPBS system was updated in the early 2000s to include the execution phase as an evaluation mechanism in the process; the updated process, now

known as PPBE, leverages analytic information from the execution phase fed back to inform the first three phases (Commission on PPBE Reform [COPR], 2023, p. 11). The NDAA for Fiscal Year 2022 endeavored to further improve the PPBE process by creating an independent "Commission on PPBE Reform" to assess all four phases of the PPBE process and make recommendations for improving the process (COPR, 2023, p. 1). The COPR's mandate included the following tasks:

- Conduct a comprehensive assessment of the efficacy and efficiency of all phases and aspects of the PPBE process;
- Review the DOD financial management systems, including an assessment of the DOD budget and programming workforces:
- Compare the DOD PPBE process with similar processes of private industry, other federal agencies, and other countries;
- Review the budgeting methodologies and strategies of near-peer competitors to understand if and how such competitors can address current and future threats more or less successfully than the United States and
- Develop and propose recommendations to improve the effectiveness of the PPBE Process. (COPR, 2023, p. 8)

In its interim report, one of the findings of the COPR was the existence of a weakness in linking budgets to strategy, namely in that DPG, which informs programming decision-making, is often issued after the services have already begun their programming phase (COPR, 2023, p. 4). Decision-makers involved in the programming phase must make justifiable, analytically based trade-offs about future end-states for the capabilities of their service in a time-constrained environment when developing the POM. The trade-offs are significant because DPG sets a top-line budget that must not be exceeded; this is the trade space programmers must work within when prioritizing programs for POM inclusion, constituting a risk decision (COPR, 2023, pp. 13–14). However, when DPG is issued late in the programming process, service decision-makers must make late-stage adjustments, which could make previous efforts moot. The COPR's recommendations, however, did little to examine the potential for systematic biases to be present within the PPBE system; this absence of research provides the basis for this thesis to explore the potential existence of biases recognized by behavioral economic concepts and provide recommendations to counteract them to improve the PPBE process.

F. BEHAVIORAL ECONOMICS FOUNDATIONS

Behavioral economics is a relatively new field combining psychology and economics to understand how people make decisions. It recognizes that people are not always rational actors, as traditional economics purports, and that various biases can influence their choices (Thaler & Sunstein, 2021, p. 10). One of the most essential concepts in behavioral economics is heuristics. Heuristics are cognitive shortcuts used by individuals to expedite decision-making with efficiency. While these shortcuts are helpful and used in almost all aspects of human decision-making, they may also give rise to biases.

One example is the availability bias. This bias occurs when judgments are based on the most readily available information. For example, if asked to judge the likelihood of a terrorist attack, one may be more likely to think it is expected if they have recently seen news stories about terrorism (Thaler & Sunstein, 2021, p.29). Another common bias is anchoring, in which one starts with a known piece of information and then attempts to adjust in the direction they think appropriate to forecast a future position. Research has shown that the adjustments in many scenarios are typically insufficient; thus, the known information dominates the decision and anchors it (Thaler & Sunstein, 2021. p.27).

Researchers in the field have identified a wide range of other biases that can influence decision-making; Thaler and Sunstein specifically identify the following biases in their book *Nudge*:

- Confirmation bias: The inclination to search for or rely on information that aligns with pre-existing beliefs while disregarding information that contradicts them.
- Framing bias: The tendency to make decisions based on how choices are presented.
- Loss aversion: The preference for avoiding losses more than gaining an equivalent amount.
- Overconfidence bias: The tendency to overestimate one's abilities and knowledge.

- Status quo bias: The tendency to prefer the current state instead of taking action (Thaler & Sunstein, 2021, pp. 26–39).

These biases can significantly impact one's decisions. With the choices made in the PPBE system and the development of the POM being conducted by people, they are not immune to the impacts of biases either. However, they can learn to reduce the impact of biases on their decisions by developing a small knowledge base of behavioral economic concepts.

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III. LITERATURE REVIEW

A. BEHAVIORAL ECONOMICS BEGINNINGS

Behavioral economics emerged in the early 1960s, representing a novel discipline exploring the psychological and social determinants influencing economic decision-making (Thaler & Sunstein, 2021, p. 1). Psychologists Amos Tversky and Daniel Kahneman began to study how people make decisions under uncertainty and found that people often make irrational decisions biased by their emotions and cognitive heuristics (Tversky & Kahneman, 1974, pp. 1124–1131). These findings challenged the traditional economic assumption that people are rational actors who always make decisions in their best interests.

In light of Tversky and Kahneman's findings, economists began to incorporate insights from psychology into their research in the 1970s and 1980s. This led to further development of behavioral economics, which challenged traditional economics in several ways (Thaler, 2021, p. 2). First, behavioral economists have shown that people are not always rational in decision-making (Kahneman et al., 1991, pp. 199–211). Second, they have shown that people's decisions are influenced by various factors, including their emotions, cognitive biases, and social norms (Kahneman, 2011, pp. 49–59). Third, they have shown that people's decisions can be affected by how choices are presented to them (Thaler & Sunstein, 2021, p. 16).

One of the most important contributions to behavioral economics was the work of Richard Thaler and Cass Sunstein. In their book, *Nudge: Improving Decisions About Health, Wealth, and Happiness*, they argued that people often make systematic errors in their decision-making. He showed that these errors can be reduced by using "nudges," minor decision environment changes that make it easier for people to make good decisions (Thaler, 2021, pp. 6–7).

Another significant contribution to behavioral economics was the work of Daniel Kahneman and Amos Tversky. In their 1979 paper, "Prospect Theory: An Analysis of Decision under Risk," Kahneman and Tversky developed a new decision-making model

that considers people's psychological biases. This model has been widely adopted in economics and other fields and has helped improve our understanding of how people make decisions under uncertainty. Specifically, they created a "value function," as seen in Figure 2.

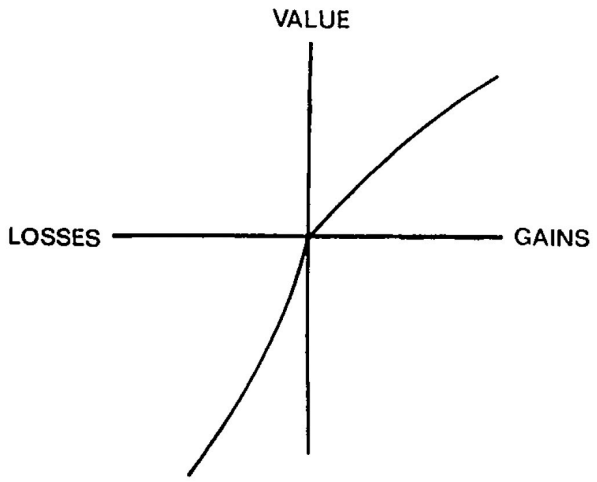

Figure 2. Value Function. Source: Kahneman and Tversky ,1979.

The value function posits that individuals do not assess outcomes in isolation but rather relative to a reference point, typically the current state or status quo. Outcomes are perceived as potential gains or losses relative to this reference point. The S-shaped curve indicates that people are more sensitive to losses than equivalent gains. The psychological impact of losing $100 is more significant than the pleasure of gaining the same amount (Kahneman & Tversky, 1979, pp. 263–291). The development of the Value Function led to the theory that individuals are more averse to losses than they are motivated by equivalent gains; the pain of losing something is psychologically more intense than the pleasure of gaining something of the same value (Kahneman & Tversky, 1979, p. 263). Building upon the realization of the value function, Kahneman and Tversky discovered the reflection effect, which highlights that people make different choices when a decision is framed as a potential gain versus when it is framed as a potential loss (Kahneman & Tversky, 1984, p. 341). When facing a gain, individuals tend to be risk-averse, while they become risk-seeking when the same decision is framed as a potential loss.

The research by Kahneman, Tversky, Thaler, and others revealed that the traditional economic assumptions of rationality and self-interest are not always accurate; emotions and perceptions influence decisions.

B. HEURISTICS AND BIASES

To further explain the discoveries of the value function and loss aversion, Thaler and Sunstein researched the psychological factors that cause such behaviors. Heuristics and biases were critical elements in the decision-making they identified. Heuristics are often helpful for quick and efficient decisions but can also lead to mistakes by predisposing decision-makers to induced biases (Thaler & Sunstein, 2021, p. 17).

Heuristics are mental predispositions learned through experience. They are often based on past experiences and one's understanding of their environment; heuristics Thaler and Sunstein identified are:

- The anchoring heuristic: People rely too heavily on the first information they encounter (the "anchor") when making decisions.
- The availability heuristic: Instead of systematically considering all relevant information, people tend to give more weight to readily available or easily recalled examples.
- The representativeness heuristic: People assess the probability of an event based on how similar it is to something they are familiar with instead of objectively evaluating it. (Thaler & Sunstein, 2021. pp. 35–41).

Biases are systematic errors in thinking caused by heuristics that lead people to misjudge situations and make less-than-optimal decisions. Some common biases include:

- Confirmation bias: People tend to seek information confirming existing beliefs and ignore information contradicting them.
- Anchoring bias: Adjustments people make to a known reference point (the anchor) are insufficient and result in a biased choice or estimate.

- Availability bias: People allow their assessment of the likelihood of an event to be influenced by how recently a similar event occurred.
- Representativeness bias: Instead of objectively evaluating statistical information, people often rely on stereotypes or generalizations to judge the likelihood of an outcome.
- Status quo bias: People generally tend to stick with their current situation instead of choosing change (Thaler & Sunstein, 2021, pp. 19–37).

Thaler and Sunstein's exploration of the value function and loss aversion shed light on the intricate psychological factors influencing decision-making. Their research emphasized the role of heuristics and biases as key components in shaping human behavior. While advantageous for expediting decisions, heuristics carry the potential for errors by introducing biases into the decision-making process. The anchoring, availability, and representativeness heuristics highlight how these mental shortcuts can impact judgment and estimation. Biases stemming from these heuristics, such as confirmation bias, anchoring bias, availability bias, representativeness bias, and status quo bias, illustrate the systematic errors in thinking that can lead individuals to suboptimal decisions.

C. CHOICE ARCHITECTURE

Thaler and Sunstein's research into biases and heuristics also found another critical factor influencing people's decisions: the environment, or architecture, in which choices are made (Thaler & Sunstein, 2021, pp.16-18). Choice architecture is the design in which choices can be presented to and the impact of that presentation on decision-makers. Central to choice architecture are defaults, framing, saliency, and incentives. Default options are the options that people will automatically receive if they do not make a choice. Choice architects can make specific options more likely to be chosen by setting them as the default option. How choices are framed can also influence how people perceive them and their choices. Choice architects can make specific options more salient or noticeable by placing them in a more prominent or noticeable position. Finally, incentives can encourage people to choose specific options (Thaler & Sunstein, 2021, pp. 103–112).

Behavioral Economics began as a counter to traditional economics, explaining consumer choices. However, the significant research and emphasis on psychology the field has explored make it ideally suited for application in other decision-making fields, including public policy and, more explicitly, budgeting and programming within the PPBE apparatus.

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IV. FINDINGS AND ANALYSIS

The Program Objective Memorandum is a critical document in the Navy's utilization of the Planning, Programming, and Budgeting Execution (PPBE) process. The POM outlines the Navy's proposed programs and activities for the next fiscal year and serves as the basis for budget decisions. Navy programmers play a vital role in formulating the POM, and their decisions can significantly impact the Navy's future operations and capabilities.

Behavioral economics concepts, identified by Tversky, Kahneman, Thaler, Sunstein, and others, such as loss aversion, heuristics, and choice architecture, can influence the choices that Navy programmers make in the formulation of the POM and have profound impacts on future capabilities of the service.

A. LOSS AVERSION

Loss Aversion theory suggests people are more sensitive to losses than gains (Kahneman & Tversky,1979). This means that Navy programmers may be more likely to avoid prioritizing programs that are perceived as having a high risk of failure, even if these programs have the potential to provide significant benefits. Navy programmers' decision-making is made even more difficult due to the intertwined relationship between PPBE, JCIDS, and the Defense Acquisition System, as they have to balance investment in new technology with legacy systems that are in use today while adhering to DPG and choices made by the JROC.

The loss aversion tendency can manifest itself in many ways. Firstly, programmers might prioritize funding for programs that focus on maintaining existing systems and capabilities, even if these programs offer limited potential for advancement. This stems from the fear of potential losses associated with investing in new technologies or approaches that could fail, overshadowing the potential gains that could be achieved. Programmers may also underestimate new programs' potential benefits, especially if they involve unproven technologies or strategies. This is because they are likelier to focus on the potential losses associated with failure, leading to a conservative approach that

prioritizes maintaining the status quo over exploring new opportunities. Third, programmers might prioritize programs that offer immediate benefits, even if these benefits are outweighed by long-term gains associated with more ambitious programs. This is because the fear of immediate losses, even relatively small, can outweigh the anticipation of future benefits, leading to a short-term focus that overlooks strategic long-term objectives. Loss aversion offers a unique insight into the psychology of decision-makers. While the aforementioned examples all have the potential to be present in the formulation of the POM, there can be many other opportunities for the concept to manifest itself in the decisions of Navy programmers.

B. HEURISTICS AND BIASES

Heuristics have a natural and unintentional impact on decisions to help make them quickly and efficiently; it is only normal that they be present in the decisions made by programmers. However, the biases that heuristics may incite could lead to less-than-optimal choices and potentially negatively impact the formulation of the POM.

The anchoring bias is likely to be manifested by Navy programmers because of the nature of the FYDP. As they formulate the POM for any given FY, they must use the information previously included by the FYDP to anchor their decisions. Navy programmers might be anchored to initial budget targets when making funding decisions. This can lead to underfunding critical programs or overfunding of less important ones. Programmers might also be anchored to past program funding levels, even if these levels are no longer relevant or appropriate due to technological changes, threats, or priorities. This can lead to inertia and a reluctance to make necessary adjustments to program funding. One prime example of this inertia caused by anchoring can be seen in the Navy's 30-year shipbuilding plan. The 30-year shipbuilding plan is based on the FYDP and outlines the Navy's long-term shipbuilding goals. Its influence can lead programmers to anchor their decisions to the plan's existing projections, even if those projections no longer reflect the most current information or strategic priorities. This can result in a reluctance to change the plan, even if those changes could lead to more optimal outcomes for the Navy.

The availability heuristic is the tendency to judge based on the most readily available information in memory. It could be particularly extant if a programmer were involved in the previous year's POM formulation. This heuristic can lead to biases in the POM formulation process, like overestimating familiar programs. Navy programmers might overestimate the importance of programs they are more familiar with, even if these programs are not the most effective or efficient. This can lead to a disproportionate allocation of resources to familiar programs at the expense of newer or more innovative ones. Likewise, Programmers might underestimate the potential of new programs, especially if they are unfamiliar with the underlying justification. This can lead to a reluctance to prioritize potentially valuable programs. One example of the impact of the availability heuristic may be seen in the Littoral Combat Ship (LCS). The Navy spent years developing the new class of ship at significant cost; continuing to prioritize the program in the POM because it had been a priority for so long could have resulted from its continued presence on previous POMs.

The representativeness bias could induce prioritization of programs similar to other programs decision-makers are familiar with. This could cause Navy programmers to favor programs that closely resemble existing ones. The representativeness bias can hinder the adoption of programs that could be beneficial because they lack similarities to programs that have been adopted in the past. Similarly, Navy programmers might dismiss programs that deviate from traditional programs, even if they offer significant potential for improvement. A historical example of the representativeness bias can be observed in the regional conflicts in the Middle East. For nearly two decades, the focus of defense budgets was on fighting terrorism and its supporters in the Middle East, while emerging threats like China and Russia were recapitalizing large, capable fleets; as a result of that Middle-Eastern focus, the Navy has had to rapidly prioritize new naval technology to meet the challenges China and Russia pose through the development of new classes of ships like the Constellation Class frigates and the Columbia Class submarines.

As with the anchoring bias, the status quo bias will likely manifest itself in Navy programmers' decisions. Programmers might resist changes to existing programs, even if these changes could lead to more optimal resourcing, for the same reasons the anchoring

bias may be present: the FYDP. The sheer magnitude of the POM and the mandate to remain within the top line set by DPG means that to stay in balance, any change in one program must lead to changes in others; thus, programmers could likely be induced to avoid changes that could throw off the balance.

Thaler and Sunstein's research in heuristics and biases has shown that they help make quick and efficient choices in many situations. However, they can lead to suboptimal choices when decisions are made in high-risk situations or under uncertainty. Therefore, Navy programmers need to be aware of the potential presence of cognitive biases in their work.

C. CHOICE ARCHITECTURE

Choice architecture plays a significant role in formulating and presenting the Navy's POM. Navy programmers are informed by how options are presented, how DPG delineates priorities, and how they are framed to align with DPG. DPG is the guidance programmers use to evaluate programs against each other and is the most critical resource informing programmers. One of the most essential aspects of DPG is its top line for each service. The top line is the maximum budget the Navy may request, and it is up to programmers to fit their priorities within the top line. In performing their prioritization, the programmers must evaluate the requests from each Budget Submitting Office (BSO) for inclusion on the POM as they relate to DPG. How well a BSO frames its request to align with DPG is likely the most compelling information for programmers to use and also serves as the justification for inclusion in the POM. Programmers must know how BSOs frame their requests and understand the importance of framing to justify programmatic choices. Program choices can be framed in a way that emphasizes the potential benefits. Programmers can make these options more justifiable by highlighting improvements in operational capabilities, cost savings, or risk mitigation. The framing technique can draw attention to the positive impacts of specific programs, increasing their likelihood of approval on the POM submission.

D. CONCLUSION

The POM is a crucial document that outlines the Navy's proposed programs and activities for the next fiscal year. Its formulation is heavily influenced by behavioral economics concepts, particularly loss aversion, heuristics, and choice architecture, which can profoundly impact the Navy's future capabilities and operations.

Loss aversion, the tendency to be more sensitive to losses than gains, can lead Navy programmers to prioritize programs that maintain existing capabilities over exploring new opportunities with potentially significant benefits. Heuristics can also influence POM formulation. The anchoring bias can lead to over-reliance on past funding levels or initial budget targets, while the availability heuristic can cause an overestimation of familiar programs and underestimate unfamiliar ones. The representativeness bias can favor programs similar to existing ones, hindering the adoption of innovative solutions. Choice architecture, the design and presentation of choices, also plays a significant role. Programmers may be influenced by how options are framed and presented, with DPG providing the most critical guidance. BSOs must effectively frame their requests to align with DPG priorities to increase their likelihood of inclusion in the POM.

Understanding and addressing the influence of these behavioral economics concepts and choice architecture is essential for ensuring that the POM formulation process aligns with the Navy's long-term strategic goals and makes the most optimal programmatic choices. Navy programmers must be aware of these biases and employ strategies to mitigate their impact to ensure the POM reflects the Navy's priorities and effectively supports its mission.

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V. RECOMMENDATIONS

Navy programmers face one of the U.S. government's most challenging and scrutinized jobs. They must create a detailed, defensible plan for how the department will allocate its financial resources. Since the inception of the PPBS system in the 1960s to the robust PPBE system in use today, various improvement has been implemented to increase the efficiency and optimize the process planners use. Utilizing the improvements from the past seven decades, the Navy and DOD have created a robust and successful program for developing the POM that resources the Navy to face the threats of today and the future. There is ample opportunity, however, to continue improving the formulation of the POM. The concepts and research that have emerged from Behavioral Economics should be incorporated into the POM formulation process. By including BE concepts and research, the Navy, the DOD, the Executive Branch, and Congress can create more efficient budgets and make the best use of taxpayer dollars.

A. REDUCING COGNITIVE BIASES

Cognitive biases resulting from heuristics are human nature. They provide positive impacts, allowing people to make quick, efficient decisions. However, in many choice environments, like PPBE and the formulation of the POM, they can also have negative impacts by influencing decision-makers to instinctual predispositions. Biases like anchoring, availability, representativeness, and status quo can lead to less-than-optimal decisions. However, by developing a simple training program to expose programmers to heuristics and biases, programmers can be informed on the various types of biases that can impact decision-making, such as confirmation bias, anchoring bias, and availability bias. Planners can also be trained to recognize these biases in themselves and others and take steps to mitigate their impact. For example, planners can be taught to challenge assumptions and seek out alternative viewpoints to reduce the impact of confirmation bias. By developing a simple training program to expose programmers to BE concepts, the Navy's financial management community will continue developing a continuous

improvement culture as delineated in the Chief of Naval Operations *Navigation Plan 2022* (Office of the Chief of Naval Operation, 2022. p. 1).

B. IMPROVE RELIABILITY OF DPG

The basis for prioritization decision-making in formulating the POM is Defense Planning Guidance. DPG informs planners on the strategic objectives of the Navy and DOD for both the present and future. While individual services issue guidance to supplement the DOD guidance, the Commission on PPBE Reform identified that guidance is often released well after the Navy has begun the formulation of the POM, limiting its usefulness (COPR, 2023, p. 4). The reliance on DPG to inform decisions and its late issuance represents fallibility in the choice architecture programmers must work with. It is understandable that DPG issuance is delayed, given that a defined defense budget has also been delayed for the past several years, resulting in overreliance on continuing resolutions (CR) to fund the DOD. Developers of DPG must, in future years, improve their ability to issue DPG on time, mitigating the effects of CRs so programmers can increase their efficiency in developing the POM. Programmers cannot delay their POM development and must make rapid modifications if late issued DPG does not align with how they prioritize programs. This creates an avenue for biases to have an exasperated effect on the POM.

By creating a training program to inform programmers of the potential effects heuristics and biases have in making decisions, specifically decisions under uncertainty, more efficient and optimal POMs can be developed. Likewise, improved timing in the issuance of DPG will better inform programmers in their task, resulting in a better allocation of resources for the Navy, the DOD, and most importantly, the American Taxpayers.

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