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**Complexity Bias and Aversion in Cultural Context:**

How Self-Construal and Cognitive Style Influence Financial Decisions About bitcoin

**Research Proposal for:**

COGST 4350: Mind, Self, and Emotion

**Presented to:**



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### **Abstract**

This study examines 210 participants from the West and East Asia's perceptions and preferences of complexity in financial decisions, particularly in terms of bitcoin. Bitcoin, a borderless and neutral asset and network, offers itself as an interesting case to study how complexity bias and aversion manifest across different cultures worldwide. This study recognizes the role of culture in constructing the self and how self-construals of independence vs. interdependence and analysis vs. holism modes of thought impact individual differences across preferences for complexity bias and aversion. Methodologically, participants in this study will respond to items from the Analysis-Holism Scale, the Self-Construal Scale, and a demographic questionnaire. Additionally, participants will encounter a series of investment tasks on bitcoin and stock allocation decisions to analyze their preferences for complexity bias vs. complexity aversion. Results from the AHS, SCS, and complexity bias vs. aversion measures will be compared between the two cultures to test hypotheses on cultural differences. The findings from this study will fill the gap in how different cultures perceive encounters with complexity in the context of bitcoin, a sound money solution to the world's broken money standard.

**Keywords:** Bitcoin, Complexity Aversion, Complexity Bias, Cognitive Style, Culture, Self-construal

One inextricable component of daily life is money and the decision-making it prompts. However, it can be incredibly complex for something so common. Worldwide, there are currently 152 different currencies from 195 different countries, creating friction in measuring and communicating value and facilitating the exchange of preferences worldwide (United Nations). Most people cannot answer the question, “What is money?.” Humans utilize cognitive short-cuts, complexity aversion and complexity bias, when they are in uncertain (decision-making) situations. Yet, there is insufficient research examining how people in different cultures perceive encounters with complexity involved in financial decisions. Importantly, the self is largely culturally constructed, and as a result, culture impacts how persons navigate daily life (del Prado et al., 2007). Culture impacts the self-construal one develops, meaning how one experiences society, whether one sees oneself as more independent from society or interdependent with society. Further, culture impacts a person’s thinking or their cognitive style, impacting if they think more about a system’s parts or it as a whole. The present study aims to fill this void, examining how different cultures, specifically that of the West (United States) and East Asia (Japan), construct preferences for complexity vs. simplicity in the context of bitcoin, a neutral, borderless, permissionless, decentralized, and rules-based global money.

### *Financial Decision Making & Complexity Bias*

Money, investing, and economics are inherently uncertain concepts. John von Neumann and Oskar Morgenstern’s 1944 “Expected Utility Theory” (EUT) and Amos Tversky and Daniel Kahneman’s 1979 “Prospect Theory” (PT) offer tools to navigate uncertainty, particularly economic. EUT describes how people should make decisions to maximize their utility (Briggs, R. A.), and PT shows how people actually make decisions, influenced by biases (Nickerson, C.).

One bias often used as a tool to influence decision-making processes, such as investing, is complexity (Duttie et al., 2015). Complexity Bias is having a preference for something with many parts, influences, and factors (Cunff, 2021). For instance, let us say you are sick and you go to the doctor. The doctor reports that you will feel better if you drink water. If you have a preference for complexity, you are more likely to leave feeling unsatisfied. Complexity Aversion is having a lesser preference for something with many parts. You are more likely to feel satisfied with the doctor's recommendation to simply drink water. However, there is little known about how different persons come to view complexity and how complexity preferences affect a person's choices (Kalaycı et al., 2016, Duttie et al., 2015). Further, before the Duttie et al. study, only theoretical approaches, not experimental approaches, existed to explain complexity aversion. (Duttie et al., 2015). This past work is relevant to this study as a common objection to bitcoin is that it is "too complicated" to understand.

Cognitive ability has been shown to be associated with complexity versus simplicity preferences. Generally, a preference for complexity increases as a person gains experience in an area yet decreases as they age (Moffatt et al., 2015). Demonstrating this trend, Oberholzer et al. observed that people with high cognitive ability have a tolerance for complexity (Oberholzer et al., 2024). However, there are conflicting findings. For example, Duttie et al. showed that people with high cognitive ability had a lower tolerance for complex lotteries, while people with low cognitive ability were not affected by the complexity level of a lottery (Duttie et al., 2015).

Methodological differences may contribute to these conflicting findings. Oberholzer et al. and Duttie et al. used different methods to assess cognitive ability. Oberholzer et al. used a shortened version of the Hagen Matrices Test, which has been validated against the Intelligence Structure Test, and received an internal reliability score of Cronbach's  $\alpha = .65$  (Oberholzer et al.,

2024). Further, they gave all participants the same lotteries, matrices, and tasks. Duttie et al. chose to use the Cognitive Reflection Test to test cognitive abilities, and it was correlated with IQ test results and students' GPA (Duttie et al., 2015). As with Oberholzer et al., participants completed tasks involving lotteries. Oberholzer et al. did observe a potential interaction of cognitive effort on cognitive ability, which could provide a reasonable account for the studies' different results (Oberholzer et al., 2024). Further, Oberholzer et al. acknowledged that people with high cognitive ability navigated complexity more easily in valuations than they did in choices.

Given that this study is regarding financial decisions, Oberholzer et al. also warn that people who lack high cognitive abilities specifically might avoid “complex, but highly rewarding options such as investing in stocks” (Oberholzer et al., 2024). If a person of lower cognitive ability views bitcoin as complex, perhaps because of their default cognitive style or because of what they have been told, they might miss out on potential benefits, which, in the case of bitcoin, uniquely, are monetary and non-monetary. Further, an MIT study demonstrated that people with higher cognitive abilities for a particular topic area can impact the decision-making of others with lesser cognitive abilities (Catalini et al., 2016). Moreover, important for consideration given the role of biases such as complexity in investing decisions, Duttie et al. also acknowledged that persons with high cognitive ability are more resistant to biases, but complexity might be an exception (Duttie et al., 2015). Complexity might be an exception because Duttie et al. found that persons of high cognitive ability were not resistant and were affected by complexity in the lotteries. Finally, understanding complexity as an exception emphasizes the importance of examining other influential factors on how persons come to view complexity, such as culture.

*Culture, The Self, and Cognitive Style*

Cognitive ability is relevant to understanding one's preference for complexity; however, critically, culture largely dictates and is responsible for how one thinks and behaves and therefore how preference for complexity develops (Swallow et al., 2020). Neisser asserts that persons highly value maintaining their "culturally-defined self," which supports Ashton James et al.'s belief that self-construal, how one sees oneself in relation to others, is one of the most foundational ways to see culture (Ashton-James et al., 2009, Neisser, 1988). Moreover, Markus and Kitayama provide fundamental work on how persons develop construals of self in terms of independence (separate from social context) and interdependence (connected with social context) and the power self-construal holds to impact the very nature of human experience (Kitayama et al., 1991). Furthermore, Singelis shows that culture can be considered in two related dimensions, yet when discussing an individual, these dimensions must be considered separately. These dimensions are cultural, collectivist vs. individualist, and individual, interdependent vs. independent.

Understanding the self as culturally constructed and looking specifically at the individual level, research highlights that persons of different cultures exhibit varied modes of thought and perception, influenced by social norms from as early as birth; East Asians often hold a holistic worldview, while Westerners hold an analytic one (Toet et al., 2016, Duttie et al., 2015). Persons with a holistic thinking style experience the world with an interdependent nature and experience the self through social relations and goals (Wu et al., 2007), through "outside in" (Cohen et al., 2002). Further, they perceive events holistically, context-dependent, by focusing on relationships within it (Swallow et al., 2020, Nisbett et al., 2015). Persons with an analytic thinking style experience the world with an independent nature and experience the self through personal goals

(Wu et al., 2007), through “inside out” (Cohen et al., 2002). Likewise, they perceive events analytically, context-independent, focusing on individual parts (Swallow et al., 2020, Nisbett et al., 2015).

Notably, there are some preliminary findings on holistic vs. analytic thinking styles’ preferences for complexity (Duttie et al., 2015), simply and with low statistical power due to a small sample size, showing people with holistic thinking styles are generally “less affected by complexity” (Duttie et al., 2015). In contrast, a study has also shown a lesser preference for complexity to be higher for East Asians than for Westerners (Moffatt et al., 2015). A variety of factors could contribute to this contrast. In the Moffatt et al. study, risk aversion is considered along with complexity aversion, and complexity aversion, or a lesser preference for complexity, is found to decline with experience, to the extent of being indifferent by the end of the study. The study by Duttie et al. also specifies investment options with different levels of risk for participants to encounter; however, they make a special effort to provide a neutral framing by using the term “preference” instead of “investment.” Further, in Moffatt et al.’s study, 83% of the Chinese participants were female, and 60% of the UK participants were male. However, the study by Duttie et al. sought to rule out gender bias specifically, so their participants from Japan and Germany were 100% male. Risk preferences and gender might be confounding factors accounting for these studies’ different findings on cultural tendencies for complexity.

Building on the preliminary findings, this study will focus on interdependence and independence (as opposed to collectivism and individualism), as Oberholzer et al. noted that acknowledging individual differences is critical to understanding how persons develop preferences for complexity (Oberholzer et al., 2024). Easterners, people with holistic thinking styles, are expected to exhibit a lesser preference for complexity and be less affected by

complexity as they align with socially normative goals of interdependence and tend to see the whole system, not its parts (Ashton-James et al., 2009). Similarly, their culture leads them to see themselves as constructed from the outside in. Westerners, people with analytic thinking styles, are expected to exhibit a preference for complexity and be more affected by complexity as they align with socially normative goals of independence and tend to see the parts of a system, not the system as a whole. Likewise, their culture leads them to see themselves as constructed from the inside out (Ashton-James et al., 2009).

### **The Present Study**

In line with the literature, this study aims to see under which cultures do complexity aversion and complexity bias manifest, specifically in regards to bitcoin adoption. While there is exhaustive literature on heuristics and biases, complexity aversion, and complexity bias, it is largely unknown how different persons come to view complexity and how complexity preferences affect a person's choices, yet it is present in many decisions, especially those related to finance (Kalaycı et al., 2016, Duttie et al., 2015). Additionally, literature suggests that different cultures interact with biases in different ways and foster different preferences. Specifically, the current study examines in a cultural context how self-construal and cognitive style influence complexity bias and complexity aversion in terms of bitcoin adoption.

The study will test participants' holistic vs. analytical thinking tendencies and self-construals in terms of independence vs. interdependence and acquire demographic information. Participants' complexity bias (preference for complexity) or complexity aversion (dislike of complexity) will be measured in the context of bitcoin or stock investment decisions following previous research. Then, to test hypotheses on cultural differences, results from the



AHS, SCS, and complexity bias vs. aversion measures will be compared between the two cultures.

The researcher hypothesizes that people with a holistic thinking style will exhibit a preference for bitcoin, which emphasizes the network as a whole, and people with an analytic thinking style will exhibit a preference for traditional investing strategies, which are heavily “part” dependent. The researcher hypothesizes that given people with a holistic thinking style are more likely to see a system’s “whole” and have a lesser preference for complexity, they will be more likely to see investing in stocks as complex and in bitcoin as simple, a singular asset supporting the social goals of and thriving through the cumulative efforts of all eight billion people. The researcher hypothesizes that given people with an analytic thinking style are more likely to see a system’s “parts” and have a preference for complexity, they will be more likely to see investing in stocks as simple because of its complexity and in bitcoin as complex because of its simplicity, unable to look at its parts in terms of traditional investing methods, missing the benefits of Bitcoin as a whole.

## **Methods**

The methods for this study will be largely derived from earlier studies to better compare across different studies (Swallow et al., 2020, Duttile et al., 2015).

### *Participants*

210 persons will be recruited for this study; 105 coming from the West, specifically the United States, and 105 coming from East Asia, specifically Japan. Despite the potential to increase the likelihood of seeing significant results, no special effort will be made to seek

participants from places with historically high “crypto” adoption. Additionally, while a model study used ORSEE, an online system for recruiting participants for economic experiments, this study will not do so to mitigate obtaining biased results from the economic prerequisite (Duttle et al., 2015, Greiner, 2004). Efforts will be made to ensure participants come from a wide age range and maintain an equal balance of genders, despite it most often being males who make investment decisions.

## **Measures**

### *Demographic Task*

To begin, the 210 participants will fill out a demographic questionnaire, asking questions regarding age, gender, education level, socioeconomic status, and hometown, adapted from Swallow et al., 2020.

### *Holistic vs. Analytic Thinking Style Task*

As previous studies have done, participants will be asked to complete the Analysis-Holism Scale (AHS) (Swallow et al., 2020, Choi et al., 2007). Choi et al., noticing an incredible amount of information on individualism and collectivism due to substantial tools stimulating research on culture and self-construal, developed this scale to account for the lack of a tool to measure between and within cultural differences in thinking styles (Choi et al., 2007). When developing the AHS, Choi et al. included four main domains, including Attention: Field Versus Parts, Causality: Interactionism Versus Dispositionism, Perception of Change: Cyclic Versus Linear, and Contradiction: Naïve Dialecticism Versus Formal Logic (Choi et al., 2007). Persons with high scores give more attention to the field, explain causality from interactions,

have cyclical perceptions of the future, and prefer using logic to come to a compromise (Choi et al., 2007). Initially, the AHS consisted of eighty items, originally written in Korean, but it was narrowed down to twenty-four with six items per domain (Choi et al., 2007). Further, participants rate the items on a scale from 1 = strongly disagree to 7 = strongly agree (Choi et al., 2007). The four different factors' internal reliability scores are as follows: Causality = Cronbach's  $\alpha = .71$ , Attitude Towards Contradictions  $\alpha = .69$ , Perception of Change  $\alpha = .58$ , and Locus of Attention  $\alpha = .56$  (Choi et al., 2007). Example items for the different factors include the following: (attention) "The whole is greater than the sum of its parts," (causality) "Everything in the universe is somehow related to each other," (perception) "Future events are predictable based on present situations," and (contradiction) "Choosing a middle ground in an argument should be avoided" (Choi et al., 2007). Finally, it is important to note that the AHS considers "analysis" and "holism" as two ends of the same dimension, not separate dimensions (Choi et al., 2007). Based on the literature, it is expected that this study will show participants from East Asian countries to have a high AHS score, indicating a holistic thinking style, and Western countries to have a low AHS score, indicating an analytical thinking style.

### *Self-Construal Task*

Next, as was also used in earlier studies and which also includes twenty-four items, participants will complete the Self-Construal Scale (SCS) (Swallow et al., 2020, Singelis, 1994). The SCS was created as a tool to measure "individual differences that define independent and interdependent self-construals" (Singelis, 1994). Similar to Choi et al.'s AHS, the SCS began with forty-five items and was narrowed down to the twenty-four most relevant items, twelve items per domain, being either independent or interdependent. Example items include the

following: (independent) “Being able to take care of myself is a primary concern for me” and (interdependent) “My happiness depends on the happiness of those around me” (Singelis, 1994). Each participant will receive two scores, one for the independent items and one for the interdependent items (Stanford). Persons with higher scores show a greater degree of self-construal (Singelis, 1994). A high score is considered that between .60s to mid .70s (Choi et al., 2007). Further, SCS incorporates a score to show the differences between independent and interdependent (INDminusINT) to separate participants’ cultures (Swallow et al., 2020, Kitayama et al., 2014). While SCS was shown to be a reliable tool, “psychological [impacts] of independent and interdependent self-construals” might be impacted by “cultural aspects of individualism and collectivism” (Singelis, 1994). Based on the literature, this study expects to find that people from East Asian countries will score higher on the interdependent item set and lower on the independent item set. Additionally, this study expects to find that people from Western countries will score lower on the interdependent item set and higher on the independent item set. This means that the study expects to find East Asians as more interdependent in their self-construals and Westerners as more independent in their self-construals.

### *Complexity Bias vs. Aversion*

This portion of the study will be derived from Duttelle et al.’s 2015 study. Participants will be presented, randomly, with twelve independent investment decisions; however, these twelve investments are framed as preferences, not decisions, to encourage a neutral perception towards the word “investment” (Duttelle et al., 2015). At the end of the study, one of these “preferences” will be chosen randomly to be “paid out.” While Duttelle et al. used an exchange ratio of 375 points = 1 Euro, this study will use 375 points = 1 US Dollar, given that USD is the World

Reserve Currency. 375 points is maintained in this study because it can be evenly divided by three, given in each of the twelve decisions, participants can choose to invest their endowment of 375 points into “a fixed payout, a risky investment option, or a mix of both” (Duttle et al., 2015). For this study, the fixed payout will be an allocation to the S&P 500 (for American participants) or the TOPIX (for Japanese participants), the risky investment option will be an allocation to bitcoin, and a mix of both will be an equal mix of allocation to the S&P 500 or the TOPIX and bitcoin.

The S&P 500 and TOPIX are used because they are considered equivalent performance indicators of the US and Japanese equity markets, and they are selected as the “fixed payout” because they return around 10% annually (Luk). Further, they are considered the “safe” yet “complex” option because the S&P 500 was introduced in 1957 (67 years ago), and the TOPIX was introduced in 1969 (55 years ago). The S&P 500 is composed of 500 leading U.S. companies, and the TOPIX is composed of 2,000 Japanese companies (Luk). Additionally, the S&P 500 and TOPIX are closed, permissioned, centralized, ruler, and trust-based systems to exchange value. Bitcoin is selected as the “risky” yet “simple” investment option because it has been in existence since 2009 (15 years ago), is a singular asset, and performed up 146.79% in 2023 and down 62.02% in 2022 (Curvo). Further, bitcoin is an open, permissionless, decentralized, (mathematical) rules-based, and trustless system to exchange value worldwide.

After the twelve investment decisions, participants are also presented with four equal payout lotteries (one baseline and three complex), yet different probabilities. Looking at investment decisions across the baseline and complex lotteries, it will be possible to see a participant’s preference for or an aversion to complexity. Based on the literature, this study

expects to find that people from East Asia will experience a complexity aversion and people from the West will experience a complexity bias.

Once all the investment preference data is gathered, results from all measures of AHS, SCS, and complexity bias vs. aversion will be compared between the two cultures, American vs. Japanese, to test hypotheses on cultural differences. Further, given that AHS and SCS scores are all continuous variables, correlations can be analyzed in relation to the bias measures. It is hypothesized that participants from Japan will have high AHS and interdependence SCS scores and will have a lesser preference for complexity, meaning they will allocate more of their endowment to bitcoin than the TOPIX. It is hypothesized that participants from the United States will have low AHS and high independence SCS scores and will have a greater preference for complexity, meaning they will allocate more of their endowment to the S&P 500 than bitcoin.

## **Discussion**

The researcher critically asserts that the existing literature is drawn from almost exclusively Western and Eastern participants. Future studies must incorporate participants from Latin America and the continent of Africa because, on the whole, their currencies have suffered far worse (hyperinflation) than that of Western or Eastern countries.

Furthermore, this proposal assumes that participants consider it a choice to adopt or reject bitcoin. However, the literature shows that not all cultures consider actions to be choices (Savani et al., 2010). Americans are generally more likely than Indians to consider an action a choice, and Indians are more likely to do so when the action involves another person (Savani et al., 2010). Further, the more important an action, the more likely an American would consider it a choice and the less likely an Indian would (Savani et al., 2010). Extrapolating, Westerners are

perhaps more likely to consider adopting bitcoin as a choice than Easterners. Further, given the gravity financial decisions carry with them, Easterners might be even less likely to consider bitcoin a choice. Notably, as Ashton-James et al. and Neisser demonstrate the critical interaction and mutual construction between culture and self, similarly, making choices and considering oneself a “chooser” are positively correlated (Savani et al., 2010). If given the US has been home to the world reserve currency, choosing a monetary policy for the rest of the world for decades and they are uniquely culturally impacted to consider themselves as “choosers,” while a large majority of the world, particularly those who need bitcoin the most, are not conditioned to see themselves as choosers, will bitcoin be adopted and adopted so far as the next world reserve currency? Notably, Easterners construct their reality and worldview from a less egocentric perspective than Westerners; Westerners might not naturally act against their ego and in the interest of the world as a whole to transition from a broken money standard to a sound money standard (Cohen et al., 2002).

Additionally, “complexity” must take into account reference points. The current world reserve currency, the US dollar/ US Treasury Bills, is the native currency of 4.18% of the global population (U.S. and World Population Clock). Americans have privileged access to the world’s most robust financial system with complex products, tools, and strategies to preserve participants’ wealth. If you are a person in the US who has grown up with the knowledge of traditional investing strategies and who is also exposed to the mainstream media “blockchain-crypto” narrative, you might be inclined to perceive bitcoin as a departure from the “norm” and as complex, just another “crypto” in a sea of thousands of “blockchain projects.” Humans look for patterns and bitcoin does not fit any of our patterns. However, if you are a person who has grown up on the continent of Africa, where 42 separate fiat currencies exist, you

might perceive bitcoin as simple. Further, the Cantillon Effect shows that populations geographically closest to the source of money creation are the most advantaged and furthest, least advantaged (River). Countries that experience monetary exploitation might produce the most salient results on preferences towards or against complexity. Bitcoin, an “open, public, borderless, neutral, and censorship-resistant” monetary system freely available to all eight billion people, offers itself as a simple and equitable rules-based solution to the breakdown in money (Antonopoulos, 2019).

Finally and critically, the literature shows that one must not assume these concepts of self-construal and cognitive style are static. Rather, they can be dynamic, influenced by the situation, culture, and/or affective state. (Ashton-James et al., 2009). Individuals are more likely to embrace new behaviors under positive affect and hold tight to cultural norms under negative affect. (Ashton-James et al., 2009). As of December 2021, 13% of the world’s population is born into the Dollar (US, AUS, CAN), Euro, Yen, Pound, or Swiss Franc, while 87% are born into autocracy or considerably less trustworthy currencies. Further, 4.3 billion people live under authoritarianism, and 1.6 billion people live under double-or-triple-digit inflation (Gladstein). It would be beyond remiss not to mention that one’s affective state, influenced by rights violations, hyperinflation, and political oppression, by the reality one lives in, will have an instrumental effect on one’s adoption or lack of adoption of bitcoin.

As early as birth, persons develop holistic or analytical modes of perception and thought and construals of self impacted by their culture, which will influence preference and tolerance for complexity; however, as mentioned, little is known in what ways, and currently only preliminary findings exist. The money is broken. This study will provide insight into how people



worldwide perceive encounters with complexity influenced by self-construal and cognitive style in the context of bitcoin and approach the transition to the sound money solution.

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