

Aging Consumers and Technological Rejection

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Abstract-- This paper aims to explore the reason why older consumers show less acceptance of technological innovative products or services by using the Control Theory framework, because assuming all non-adopters as homogeneous may be inaccurate. Since many older consumers have rejected technological innovative products, we should learn more by focusing on understanding the reasons for innovation refusal rather than just on the reasons for adoption. The Control Theory framework is well suited to explore the concept of technological innovation acceptance for older consumer behavior because this theory focuses on the individual's goal and development regulation across the life-span. It is expected that goal influences on directions, vigor, energy, persistence of action and finally termination.

This study will also merge Aging Theory effects (moderators) with Control Theory because many aging theories are likely to be maximized under circumstances where primary control is lost.

At the conceptual level, this paper tries to seek a better understanding regarding the differences between primary control (goal engagement strategy) and secondary control (goal disengagement strategy). Knowledge is needed as to whether different types of control strategy might affect aging consumer's behavior regarding technological innovative acceptance.

I. INTRODUCTION

The aging consumer segment is growing in economic significance as its numbers increase. Its unique needs will also encourage the development of many consumer innovations [79]. In the last few decades, terms such as 'aging and mature marketing', which refers to marketing's role in addressing the needs of older adults, has assumed greater importance than ever before [97]. The purchasing power of the elderly in the U.S. is getting more important because it is estimated that those people aged 65 or over account for up to \$200 billion of spending a year [100]. Companies and researchers cannot afford to ignore such a significant and growing group of consumers. Currently, a large number of companies do not make any effort to market to the older segment because these companies either still do not see its importance or do not understand how to market to this group of consumers [91]. Throughout the paper the terms "elderly", "senior", "mature consumers", "aging consumers" and "older consumers" are used interchangeably. For purposes of this study, aging consumers are defined as those persons 65 years or older.

Older Consumers and Technological Innovations

There seems to be no clear definition for the mature, or older consumers. "Unfortunately, we do not have a common definition of 'mature' or 'older' consumers, because the definitions vary from those which apply to the age median

(33 years) all the way up to 65 or older" [87, p.13]. Some of the earliest studies in the field considered the 50-plus segment of the population as a "mature" or "older" market [8]. Today, older consumers are often defined as those falling into the 55-plus segment [92]. Furthermore, many researchers define older consumers as those 65 years of age and older [33, 80]. Age may be the simplest way of segmenting the mature market, but is probably the least effective, since it does not correlate well with behavior [95].

Advancements in computer technologies and increased Internet use have changed the way many individuals live, work, play, and communicate, since IT equipment is getting smaller and more portable [22]. It assumes that technological innovations are always good and should be adopted by everyone, but the huge body of literature on innovation diffusion has suffered from pro-change bias [116]. Previous research states that firms operating in the health services industry could benefit from having aging consumers online because online seniors tend to search for information related to medical products and services [41].

II. PROBLEM DEFINITION

Older consumers face barriers to technological innovative acceptance and have adopted computers and the Internet at a much slower rate than younger consumers [43]. Elderly people are likely to reject new technologies and innovations as too complicated and difficult to understand and use [69]. A previous study also confirms that older, less educated, minorities and lower income individuals have lower Internet usage rates than those of younger and more highly educated [110]. Many technological innovations fail to be adopted by older consumers because use of the new product is incompatible with the physiological abilities of this group [79]. A focus group study of healthy and active older adults found that the elderly faced a variety of challenges from new technologies [117]. There seems that learning to use technological innovative products may provide particular challenges to the elderly. Since innovations mean change to consumers, and resistance to change is a usual consumer reaction that has to be overcome before adoption will begin.

Aging consumers have a lowered motivation when it comes to learning to use new products or even change their preferred brand because the utility of effort and level of self-efficacy (the belief that one has the capability to perform a particular behavior) can be expected to decline with age [70,72]. Reference [73] confirm that not only younger consumer have greater tendency to switch their preferred brand, but also older consumers show a tendency to remain attached for a longer duration to the same preferred brand.

This paper aims to explore the reason why older consumers exhibit less acceptance of technologically innovative products or services by using the proper framework, as the assumption that all non-adopters are homogeneous may be inaccurate [76]. Reference [126] states that since the vast majority of older consumers have rejected technological innovative products, we should learn more by focusing on understanding the reasons for innovation refusal rather than on the reason for adoption.

The study of human behavior in later life has been explained through biophysical, psychological and social changes [82, 74]. While biophysical changes are related to the functioning of an individual including manner, speed of information processing and physical changes in the human body, such as impaired eyesight. Psychological and social changes include changes in attitudes, personality and needs, as well as changes in position and role in society.

Indirectly relevant frameworks involve physiological and biophysical changes, which are related to a decline in physical capabilities, such as quality of eyesight, arthritis and the information processing speed. Physiological and biological changes are important because these changes can affect consumer behavior [122]. There is also evidence that older adults are likely to experience age related declines in physical and cognitive abilities [123].

Directly relevant frameworks are psychological and social changes, which are related to attitudes toward changes in daily routines, the degree of visible benefits, and perceived image of technological innovations. These changes may be precipitated by cognition, personality, retirement, income decline, financial instability, family changes, and the like. Reference [82] suggests that the elderly are less likely to use the technological innovations due to their pessimistic attitudes towards technology, and that most elderly will probably not try to use them on their own. Reference [1] indicates that many elderly do not have the confidence in their ability to use the Internet for personal business transactions, and that women are less confident than men. Furthermore, the vast majority of seniors who do not use technologically innovative products and services, such as online purchases, do not think they are missing anything [45].

From both direct and indirectly relevant frameworks, there seems to be more than one aging theory that can explain this phenomenon.

On the other hand, this paper aims to explore lack of technology acceptance by using the broader relevant framework, which is Control Theory, as this phenomenon has never been explored or explained by using Control Theory.

III. THEORETICAL EXPLANATIONS THE RESISTANCE OF AGING CONSUMERS TO USE TECHNOLOGY

First, the paper will review the diffusion of innovations theory, which explains how, why, and at what rate technology spreads through different cultures and also the Technology

Acceptance Model. This paper will explore aging theories which can potentially explain why the majority of aging consumers exhibit less acceptance of technologically innovative products and services.

A. Diffusion of Innovations Theory

Based on the diffusion of innovations theory, there are four elements that encourage others to adopt technology [115].

1. The innovation itself;
2. The communication channel selected to facilitate the diffusion;
3. Time, particularly with respect to rate of adoption; and
4. The social system in which the diffusion is attempted.

In addition to the above elements, technology readiness of potential users is among the factors affecting how fast and to what extent potential users adopt a technology, and this term refers to people's propensity to embrace and use new technologies for accomplishing goals in home life and at work [103]. The Technology Readiness construct was developed to measure people's general beliefs and thinking about technology, and this construct has four sub-dimensions: technology optimism, innovativeness, technology discomfort, and insecurity of technology. A previous study states "senior citizens, as being the least likely to try new technologies, ...that technology might provide disappointing results...they are far more likely than others to believe the benefits of technology are grossly overstated...as a group, seniors display more technology discomfort and less technology optimism than other age groups" [103, 42:p.66]. However, it seems that the Technology Readiness construct is not well suited to analyze this phenomenon, because this construct only refers to attitudes towards technology. Variables other than attitudes toward technology could be equally or more important. It is widely accepted that people age as biological beings, psychological beings, social beings, and even as spiritual beings [82].

B. Technology Acceptance Model

Some researchers have used the TAM (technology acceptance model) to examine problems of engagement with IT; however, this approach is inadequate as a model to explain and stimulate increased engagement for older consumers [60]. Reference [29] hypothesized that the TAM approach is based on two factors: 1: perceived usefulness; and 2: perceived ease of use. All aspects of product benefits (features, packaging, service, brand name) could influence perceptions of both: usefulness and ease of use. However, older consumers don't want to use the products that will remind them of their old age. Furthermore, they would like to carry on their "youthful self-concept".

Next, the study will review aging theories that are potentially suited to explain this phenomenon, but these aging theories are not the main conceptual framework of this study. Finally, this paper aims to explore this phenomenon by using

the broader relevant framework, which is Control Theory. Aging Consumer Theory can roughly be classified into three categories, which are biological beings, psychological beings and social beings.

1) Biological Theories have been studied regarding maturation and the decline in different functions of the body. Not only are there changes in the chemical composition of the body with age, but also there is an increase in mortality with age [24]. Biological Theories assume that aging is affected by either genetic factors or environmental causes. The study of biological aging is significant because aging is associated with physiological changes, such as hearing ability and a number of diseases and disorders that could affect consumer behavior [87].

2) Social Aging Theories involve the responsibility of people to positions and roles in society based on ideas about what people at different ages or life stages are capable of, and what is considered appropriate for them [87].

3) Psychological Theories have been used to study either continuous growth or change in cognition and personality. They mainly view how cognition and personality change over the lifespan, and most views focus on the person, the environment, or both [90, 109].

IV. CONTROL THEORY

Control theory starts from the assumption that any human behavior, in order to be effective, needs to fulfill two basic requirements: the management of selectivity (goal) and the compensation for failure experiences [52]. Because of the flexibility and immense scope in human behavior, an individual needs to select specific behavior options, and needs to protect these selections against competing action tendencies. A powerful system of motivational and volitional regulation that guides the choice of action goals and also safeguards and enhances focused commitment to a chosen action goal is needed [56, 54]. This theory concentrates on “the distinction between primary control and secondary control strategies, the proposition that striving for primary control holds the primary function in the motivational system, and the idea of selectivity and compensation as fundamental requirements of optimizing life course development” [55, p.32].

The integration of these two fundamental dimensions includes a set of four strategies in development regulation: selective primary and compensatory primary control, and selective secondary and compensatory secondary control.

Selective Primary Control focuses on the investment of resources, such as effort, time, abilities, and skills, into the pursuit of a chosen goal including the development of skills by processes of acquisition and practice. This is the case, for example, since everyone would agree that advancements in computer technologies and Internet help many individuals live, work and communicate easier. Selective Primary Control typically is about self-learning how to use a computer and the Internet. Reference [55] give the example of striving

for career promotion, the person who has set this goal for her- or himself with a selective primary control strategy will invest more time and effort into work.

Compensatory Primary Control is about asking for others' help or assistance. It is necessary when the given internal resources of the individual prove insufficient to attain the chosen goal.

This is the case, for example, as everyone would agree that advancements in computer technologies and Internet help many individuals live, work and communicate easier. Compensatory Primary Control typically is about asking for other people's help in order to understand how to use computer and Internet. Reference [55] give the example of striving for career promotion, the person who has set this goal for her- or himself with compensatory primary control strategy will seek advice from more senior colleagues on effective strategies to help career success.

Selective Secondary Control serves to enhance the selectivity of resource investment in the continuous pursuits of primary control goals. In motivational psychology terms, selective secondary control strategies can be likened to volitional strategies. Selective secondary control strategies are about increase the value of the chosen goal and safeguard motivational commitment to the goal [50]. Reference [55] give the example of striving for career promotion, the person who has set this goal for her- or himself with selective secondary control strategy will dream the positive consequences and pride that would come with achieving the career promotion.

Compensatory Secondary Control is a safeguard against the potential negative effects of failure on the motivational resources of the individual. Secondary control strategies are disengagement from unobtainable goals and downward social comparisons. Reference [55] give the example of striving for career promotion. When the career promotion is unachievable, the person who uses compensatory secondary control strategy will use self-protective strategies, such as self-protective casual attribution, focusing on successes in other domains, and downward social comparisons.

V. TECHNOLOGICAL INNOVATIVE PRODUCTS AND SERVICES

Technologically innovative products are those that employ technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics in their use and are significantly improved with respect to their specifications or intended uses [94]. An example of technological innovative products and services is the smart phone, which offers mobile entertainment, social networking and business assistance applications.

Previous empirical studies support the view that technology use can make a large positive difference in the lives of aging adults, including people with problems in everyday functioning [118].

VI. THE MODERATING INTERPRETATION OF THE RELATION BETWEEN THE CONTROL THEORY AND AGING THEORY

A moderator variable is the function of a third variable, which is a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable [9]. It seems that biological changes, social changes and psychological changes of control-related phenomena are interesting because they are likely to be maximized under circumstances where primary control is threatened. For example, loss of social contacts after retirement (social changes), the declines in older adults brain function (biological changes) and less optimistic attitude toward technology (psychological changes) may drive them to exercise compensatory secondary control strategy.

For this reason, this study is merging various aging theories (moderators) with Control Theory.

A. Technological Capability as a moderator

From a resource-based perspective, capabilities are intangible resources, made up of components such as skills, learning and knowledge in deploying tangible or other intangible assets [138; 35]. A previous empirical study from the innovations literature states that capabilities are important in explaining inertia when a new technology is knowledge-destroying or competency-destroying [133]. Capabilities are more specialized through learning, and through the adaptation to one specific situation. For example, if older adults can only create a very small number of options based on their current capabilities, they might speed up their choice of options and therefore speed up skills. The cognitive approach found in the literature to support an understanding of the capabilities is the cognitive style approach [23]. Older consumers will not use technologically innovative products except when their skill level matches the technology [67].

Previous studies explain that older adults have greater difficulty in acquiring technology skills than younger adults and their ability to learn technology skills are slower than younger adults [26]. Elderly who has low technological capability may use goal disengagement strategy (Compensatory Secondary Control), such as self-protection, downward social comparisons and downgrade importance of using technological products.

Thus, we expect that the positivity of the relationship between Compensatory Secondary Control level and preference to use non-technological innovative products and services was considerably stronger for low level of technological capability than for high level of technological capability.

B. Financial Status (Affordability) as a moderator

Based on the Age Stratification Theory (Social Aging theory), it seems that retirement is the important age stratum

for elderly people. A previous study stated that the most unfavorable effects produced by a retirement result from depressed life conditions after the retirement, such as income decline, rather than from the retirement itself. After retirement, older consumers may face financial problems due to a lack of saving and small pensions. They may be concerned about their expenditures and feel that technologically innovative products are too expensive. "Financial problems can be expected to negatively influence individuals' personal development across a broad range of life domains, such as family development, leisure activities, and lifestyle [142, p.388]". Previous research mention that two main problem with technology for aging consumers have been high cost and a mismatch between function and needs [69]. Elderly people who cannot afford them may use a goal disengagement strategy (Compensatory Secondary Control), such as downward social comparisons and downgrade the importance of using technological products. On the other hand, older consumers who have good financial conditions may use a Selective Control strategy or Primary Control strategy, such as investing time and effort or being taught by technological experts.

Therefore, it is expected that the positivity of the relation between Compensatory Secondary Control level and preference to use non-technologically innovative products and services will be considerably stronger for those with low levels of financial status (Affordability) than for high levels of financial status (Affordability).

C. Perceived Chronic Stress as a moderator

Older adults are seen to be more likely to experience technological stress (physical and emotional burnout caused by an inability to adapt to new technology) compared to the younger generation [36]. Using technological innovative products and services may have been viewed as stressful experiences for older adults because there are incompatible level of technology knowledge and their capabilities.

Theories of stress (Psychological Theory) have been used in psychology since 1950 which focused on changes as the basic mechanism of stress and have two main forms of stress: acute stress and chronic stress [125]. "Acute stress refers to discrete, observable events which are thought to be threatening because they represent change.....and chronic stress refers to continuous and persistent conditions in the social environment resulting in a problematic level of demand on the individual's capacity to perform adequately in the social roles" [139, p. 210]. Chronic stress is distinguished from acute stress primarily by its longer duration.

Most people would agree that elderly who have high degree of perceived chronic stress from using technological innovative products may exercise goal disengagement strategy (Compensatory Secondary Control), such as downgrade importance of using technological products. On the other hand, older consumers who have low degree of perceived chronic stress from using non technological innovative products to technological innovative products may

use Selective Control strategy or Primary Control strategy, such as invest time and efforts or taught by technological experts.

D. Technological Past Experience as a moderator

Cognitive Theories (Psychological Theory) explain how the perception and decision making change at various stages in the life-cycle. From this theory, older consumers increase new cognitive skills throughout life and cognitive development enlarge from their experiences.

The more technologies are used by elderly while they are healthy, the more willing they will be to use more advanced technological supports when their capabilities decline [96]. A decrease in technology-related anxiety when experience increase and for both younger and older adults higher levels of computer experience are associated with lower levels of computer anxiety [20, 32]. Furthermore, prior study shows that experience with computers results in a more positive attitude toward computers regardless of the age of the respondent [27]. It is possible that earlier-in-life technological experience could be another important factor. Older adults, who have experiences in technological products and services, may feel more comfortable to use other technological innovative products and services.

Hence, it is expected that the positivity of the relation between Compensatory Secondary Control level and preference to use **non** technological innovative products and services was considerably stronger for a low degree of Technological Experience in technological products and services than for a high degree of Technological Experience in technological products and services.

VI. CONCLUSIONS AND DIRECTION FOR FUTURE RESEARCH

Understanding whether and why aging consumers prefer not to use technologically innovative products or services represents a critical insight which is so far missing for marketing professionals because the elderly are a large, growing segment.

This study tries to understand why aging consumers tend to be technology-averse. Why are aging consumers less accepting and tolerant of technology?

All aging theories are associated with a number of biological changes, social changes and psychological changes that could affect why aging consumers are non-acceptance technological innovative products and services. It is very possible that there is no single aging theory could serve in understanding this phenomenon but rather a variety of aging theories. However, the goal of this paper is not to explain this phenomenon by using any aging theories, but to look at them from a different point of view using the broader framework of the Control Theory. This theoretical framework is well suited to explore the concept of technological innovation acceptance for older consumer behavior because this theory focuses on the individual's goal and development regulation across the life-span. A previous study stated that "with regard to Internet

usage...researchers should investigate the impact of an individual's personal goals on their use of the Internet" [110]. This theory proposed causal effects of individuals' endorsement of control strategies on technological innovation acceptance. Besides, this study is increasingly interesting by merging Aging Theory effects (moderators) with the Control Theory because many aging theories are likely to be maximized under circumstances where primary control is lost.

From this Control Theory, it is expected that aging consumers will exercise Compensatory Secondary Control strategy and perhaps do not feel a need to use technologically innovative products and services. Elderly people's loss of social contacts after retirement and utility of effort also declines with age because of health limitations. These factors can be barriers for older adults to exercise a Primary Control strategy.

H1 (a): Aging people with a higher Compensatory Secondary Control (CSC) level prefer to use **non** technological innovative products and services rather than those with a lower CSC Level.

H1(b): Aging people with higher Selective Primary Control (SPC) and/or Compensatory Primary Control (CPC) level prefer to use technological innovative products and services rather than those with lower SPC and/or CPC Level.

H2 (a): The positive relation between Compensatory Secondary Control and preference to use **non** technological innovative products and services is stronger in aging people with a lower level of Technological Capability.

H2 (b): The positive relation between Primary Control (SPC and/or CPC) and preference to use technological innovative products and services is stronger in aging people with a higher level of Technological Capability.

H3 (a): The positive relation between Compensatory Secondary Control and preference to use **non** technological innovative products and services is stronger in aging people with a lower level of Affordability.

H3 (b): The positive relation between Primary Control (SPC and/or CPC) and preference to use technological innovative products and services is stronger in aging people with a higher level of Affordability.

H4 (a): The positive relation between Compensatory Secondary Control and preference to use **non** technological innovative products and services is stronger in aging people with a higher degree of Perceived Chronic Stress.

H4 (b): The positive relation between Primary Control (SPC and/or CPC) and preference to use technological innovative products and services is stronger in aging people with a lower degree of Perceived Chronic Stress.

H5 (a): The positive relation between Compensatory Secondary Control and preference to use **non** technological innovative products and services is stronger in aging people with a lower degree of Technological Past Experience.

H5 (b): The positive relation between Primary Control (SPC and/or CPC) and preference to use technological innovative products and services is stronger in aging people with a higher degree of Technological Past Experience.

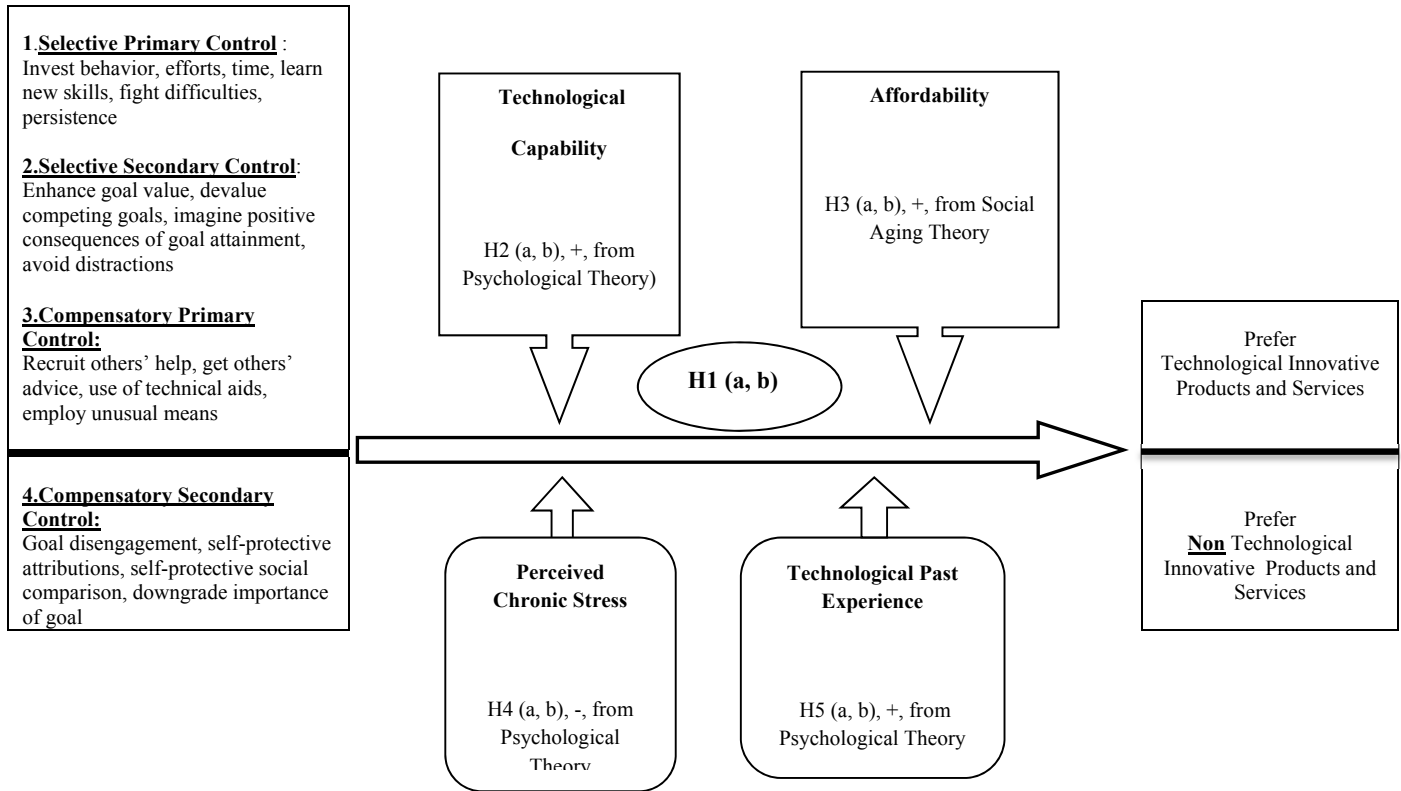


Figure 1 : Framework of Control Theory with Technologically Acceptance

With cross-sectional design, self-administered questionnaires are applied in the present research. This method is considered an easy way to present questions, good for long or complex response, and more confidential comparing to personal interview and particularly appropriate lower cost technique for closed end questions.

In this research, descriptive analysis and correlations will be analyzed. The internal consistency reliability can be identified by Cronbach's alpha statistics to determine construct consistency. The confirmatory factor analysis will be conducted to access construct validity. For hypothesis testing, we use logistic regression to predict the outcomes.

Reference [107] introduce a minimum sample size of $10k/p$, where k is the number of independent variables and p is the smallest of the proportions of the negative or positive cases in the population. So with eight predictors and the proportion of positive cases in the population is 0.2 (20%), this study would need a sample size of $10 \times 8 / (0.2) = 400$.

In summary, it seems that previous research efforts have created a micro understanding to help explain why many aging adults do not feel a need to use technological innovative products or services. Many previous studies observe this phenomenon by focusing on aging theories. On the contrary, this study will use Control Theory, a broader relevant framework to explain this situation and expand to include several aspects of aging theories as moderators. Furthermore, after careful searching, it appears this

phenomenon has never been explored by using Control Theory.

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