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Behavioral Finance: Psychographics

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BEHAVIORAL FINANCE: PSYCHOGRAPHICS

A Thesis

Presented to the

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In Partial Fulfillment

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by

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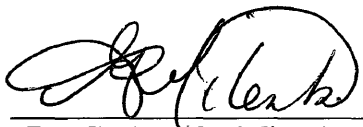

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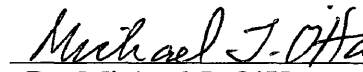

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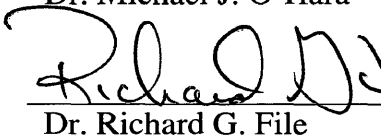

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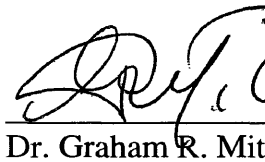
Chairperson 

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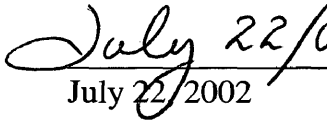
Date 

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BEHAVIORAL FINANCE: PSYCHOGRAPHICS

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This research is a review of psychographics and its impact on rejoinder. Experiments were conducted to ascertain the association between two stimuli and changes in habitual behavior. The foci of this review are to examine applicable, previous research and compare with results on the two stimuli. Statistically different responses to the stimuli were observed.

ACKNOWLEDGEMENTS

I would like to thank, above all, my wife Tami, for her understanding and patience while I pursued my MBA. She endured as many grueling hours of school work as I did by taking care of everything else. She has been, and will always be, a motivating force. In addition, to our girls, McKenzie and Jenna, that their patience showed through during all the times of missed soccer games, dances, tea parties, and meetings at the swing set because school took precedence. Lastly, I would like to thank my thesis advisor, Dr. Graham R. Mitenko, as he was the genesis of the paper and helped guide me through a process, that at times, seemed to be at breakneck speeds. I would also like to thank my Thesis Supervisory Committee: Dr. Graham R. Mitenko, Dr. Michael J. O'Hara, and Dr. Richard G. File. Their commitment and guidance helped transform this thesis to what is contained hereinafter.

CONTENTS

INTRODUCTION

The ability to segment a market to identify a company's target market is always important to an organization, regardless of the industry. One approach to market segmentation is through the understanding and utilization of psychographics. Psychographics, for the purposes of this paper, is defined as behavioral responses to color stimuli. If through the utilization of psychographics the company is able to effectively identify their target market(s), then, a company is able to understand some of the motivating factors behind financial decisions and to understand why consumers act in certain behavioral patterns. Once this understanding is obtained, a company is able to strategically exploit those behaviors and minimize risk of non-optimal returns.

It is this potential that presented the question: can psychographics enhance collection letters to debtors and in some way influence their financial decisions? In short, does the ability exist to exploit psychographics in the collection industry? This paper explores that possibility of employing psychographics in the collection industry. The methodology, analysis, and conclusions are contained hereafter.

LITERATURE REVIEW

HISTORY OF PSYCHOGRAPHICS

Psychographics research was done as early as the 1930s. From this time, until it was extensively developed in the late 1960s, psychological information of two types had been researched: motivation and personality research. Gunter and Furnham noted that by the end of this period, the motivation research began to be questioned on grounds of small sample sizes and the validity of its meanings, while personality research continued to be plagued with consistently low correlation to consumer behavior. The authors stated that neither technique produced the results needed to predict consumer behavior.

The goal of some research was to construct new measures that would portray consumers' personal fears, needs and desires (motivation research) but within larger samples that could be quantitatively analyzed (personality research) and that also could reflect the different types of lives which the subjects were living (demographics). While not formally defined at this point, psychographics began its entry into the marketing arena.

The history of psychographics can be traced to the 1930s when research was targeted at understanding consumer behavior and how three variables: predisposition, external influence, and product attributes, interacted. While no models were developed at this time, the door was opened to researchers who wanted to study these psychological aspects to marketing. Much of this research was dismissed until the late 1950s and early 1960s when these three variables began to be studied in the marketing

community. At this time though, there was not much support for these theories among much of the marketing community. Through continued research, psychographics was born. Gunter and Furnham discussed Emanuel Demby's definition of psychographics.

1. "Generally, psychographics may be viewed as the practical applications of the behavioral and social sciences to marketing research.

2. More specifically, psychographics is a quantitative research procedure that is indicated when demographic, socio-economic and user/non-user analyses are not sufficient to explain and predict consumer behavior.

3. Most specifically, psychographics seeks to describe the human characteristics of consumers that may have bearing on their response to products, packaging, advertising, and public relations efforts. Such variables may span a spectrum from self-concept and lifestyle attributes, interests and opinions, as well as perceptions of products attributes."[1]

In short, Demby looked at how the market was segmented by using the factors of psychology, sociology, anthropology, the market's segment propensity, and reasons, behind purchasing decisions.

COLORS & MEANINGS

Psychographics is important to a business when considering the possible variances in response rates due not only to frequency but also to the timing of such responses and based on color variability. For business, it is important to harness the purchasing power of the consumer for their gain. This may involve the sale of their goods or services.

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[1] Barrie Gunter and Adrian Furnham, Consumer Profiles: An introduction to psychographics, ed. Gordon Foxall, London, Routledge, 1992, 64 – 65 quoting Emanuel Demby, "Psychographics and from whence it came", in W.D. Wells (ed.) Life Style and Psychographics, Chicago: American Marketing Association, 9-30.

Another way to look at this is being amongst the first to secure the consumers disposable income.

The implications of color utilization to evoke emotion and ultimately a response, preferred or not, has limitless possibilities for business. In exploring the area of color utilization, businesses must consider the implications of color and its accompanying attributes when attempting to persuade consumers. To assist in these determinants, one must consider three key areas relative to response rates and payments. Those areas are:

- Regional color variance;
- Rules for applying color to business;
- Emotional responses to various colors.

These three key areas will now be discussed in detail.

REGIONAL COLOR VARIANCE

Businesses generally do color research on entire populations. Then the preference and responses based on the entire population of the sample determine the preference for the population as a whole. There is little or no dissection of the chosen population into regional variation based on color response. Regional differences are often recognized in regional cuisines and customs but companies often overlook color and its impact.

"Regional colors are often widely unacknowledged locally, even though they have been handed down for generations and used almost instinctively."[2] This distinctive

[2] Shigenobu Kobayashi, Colorist: A Practical Handbook for Personal and Professional Use, trans. Keiichi Ogata and Leza Lowitz, Tokyo, Kodansha International, 1998, 34.

nature of color difference is what continues the presence and persistence of colors engrained into regional culture. Examples of regional differences of color include the dominance of red buildings in the northern climates to create a warming effect and blue buildings found in areas near oceans, beaches, or the sea.

It is a difficult task to identify and properly execute, business plans based on distinct regional color differences. However, the identification and proper execution of a business plan that is based on state color differences could be the factor that separates the average company from the premier company in the field. Kobayashi States, "we often fail to take into account the importance of local colors that characterize a particular area."[3] He also States that "colors have intrinsic quality: essential yet as inconspicuous as the air we breathe."[4]

It is known in the collection industry that regional variation exists when considering recovery performance by State alone. With varied recovery performance by State and the color preference by region, the study of response and recovery rates to collection notices and color variance was tracked by State for this study to properly assess any State variances that might exist. The findings of any regional preferences that may have been found are included below.

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[3] Ibid., 48.

[4] Ibid., 48.

RULES FOR APPLYING COLOR TO BUSINESS

Color utilization on notices in the collection industry has both positive and negative implications for liquidity. If the collection industry even hopes to effectively use color to generate an emotional reaction from their customers and ultimately, become part of the prime directive for their discretionary income, collection companies must first understand some general guidelines when applying color to their business procedures. The business checklist that Kobayashi addresses is summarized below.

Kobayashi States; first, a broad perspective must be kept, including keeping an open mind to new possibilities, recent business developments, news from academia and other revelations from fields similar but not closely related.

The next common hurdle for business is to use data, and only data. All to often, human emotion and preference play a role in modifications to business plans. The ultimate effect is a migration away from the variables causing the correlation to the business trend being tracked. In the test company's case, communications with the debtor is the key element to successfully liquidate the portfolio. Communication with the debtor happens through two mediums, letters and phone calls. The former medium is where statistics must play a vital role. Statistics tracking responses based on a notice's verbiage, font and paper color will garner the intelligence needed to continually update the business strategy employed to liquidate the maximum dollar amounts of the portfolio. By analyzing data, companies can effectively gauge variance and trends in the data, for example, seasonal or cyclical variances.

Third, business must consider the area of sampling and its everyday life, and images. This area entails researching the current trends in the region through a valid sampling of the region. Then, by evaluating the samples, options can be narrowed as to the current colors utilized in the region. These samples should be taken from the activities of the local individuals and the findings based on data taken from daily life. Lastly, when selecting colors, always consider the near term and longer term status. The answer to the length of term will influence the strategy employed on a monthly, quarterly, or yearly basis. An applicable example for the test company is to consider the regionality of a color's response and the climate. Does the climate change throughout the year as in Region A or is it more constant as in Region B? If the response rates are statistically higher and constant across seasons in Region B for a given font or paper color, then weight should be given to the consistency of this climate in this region. The predictions of which stimuli will generate superior changes in habit, based on these cultural differences and observation, is reserved for future research.

Another component to increasing a business' understanding and assistance in application of color is through communication. Communication should be sought and consideration given from experts in the field. For debtor communication through notices, companies should consider those involved with notices such as mail vendors, peers in the industry, those in a like industry or in an unrelated industry. In addition, psychologists may be employed for their input on psychographics.[5]

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[5] Ibid., 143.

EMOTIONAL RESPONSE TO VARIOUS COLORS

Is red considered a warm color? Is blue considered a cool color? Do red and blue invoke different emotional responses in us as humans? These are just a few questions that should be asked when gauging the emotional responses to different colors. Birren states, "...that human beings, like all living creatures, have a sense for radiation and that this sense may be independent of the conscious vision itself."[6] Some questions Birren did not discuss but may be a product of our culture today include the following: Do color preferences vary by culture or ethnic origin? Do color preferences vary by sex? Do color preferences vary by age? These questions have been the subject of other recent tests and are relevant questions when considering the emotional responses to colors. However, they are outside of the scope of this test.

The light spectrum is made up of a color continuum with two ends. The two ends being red and violet. The order of the continuum is made up of red, orange, yellow, green, blue, indigo, and violet. Each section of the continuum invokes "different levels of activation both in the autonomic nervous system and in the brain."[7]Research has shown that red generates excitement and influential responses. Birren discusses the physiological reactions that generally begin from complete inaction and are typically greater with the warmer colors of red versus the cooler colors with a blue hue. Birren generalizes that "all color affects muscular tension, cortical activation (brain waves),

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[6] Faber Birren, The Effects of Color on the Human Organism, American Journal of Occupational Therapy XIII:3 (March – April 1959): 126.

[7] Ibid.

heart rate, respiration and other functions of the autonomic nervous system – and certainly that it arouses definite emotional and esthetic reactions, likes and dislikes, pleasant and unpleasant associations."[8]

Birren's work focused partly on the work of Robert Gerard. Gerard researched light, color, and the associated psychophysiological impacts. Birren discusses how Gerard focused on answering questions relating to studies of light, color, and its effects. Gerard's questions were as follows. Do hues of red and blue arouse different feelings and emotions? Do they induce correlated changes in autonomic functions, brain activity, and subjective feelings? Do the patterns of response correspond to the relative energy of the colored stimuli? Gerard measured various physical responses such as "blood pressure, palmar conductance (electrodes in the palm of the hand which indicate arousal of the autonomic nervous system through reaction of the sweat glands), respiration rate, heart rate, muscular activation, frequency of eye blinks, and brain waves"[9] to name a few.

Gerard's results showed that both ends of the color spectrum produced immediate reactions in the palmar conductance. However, arousal based on red was longer in duration than that associated with blue light. Gerard's results showed that "red consistently showed a more pronounced pattern over blue, both upon the introduction of

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[8] Ibid. 127.

[9] Ibid.

this stimulus and after a period of time."[10] Gerard also found that "...both colors produced immediate increases (in reaction). However, arousal after a period of time was consistently higher for red than for blue."[11] Physiologically, the eye has an elevated initial response to red, followed by a swift exhaustion; while physiologically blue is seen more easily, but does not trigger as visceral a reaction.

The research of Birren and Gerard can be utilized with the response test of a collection notice's font and paper color when considering the possibility of regional preferences. While reserved for future research, it is possible that while warmer colors may induce longer periods of reaction, those reactions, in some regions, may cause too much emotion limiting the effectiveness of the color when considering response rates and times. In addition, varying which text to specifically color (e.g., amount due, selected verbiage, or the entire notice) also may invoke different reactions by region. Again, this possibility is reserved for future research.

PREVIOUS STUDIES

While extensive research exists on the relationships between font and paper color and emotional responses, many of the studies were an expansion of Stroop's research of incongruent color stimulus. Other studies measured the emotional response to color by gender, age, and ethnic origin. However, while all of these studies offer limited

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[10] Robert Gerard, "Differential Effects of Colored Lights on Psychophysiological Functions (Ph. D. diss., University of California, Los Angeles, 1958), quoted in Faber Birren, The Effects of Color on the Human Organism, American Journal of Occupational Therapy XIII:3 (March – April 1959): 128.

[11] Ibid.

applicability, few studies were found that showed similarities to a mailing response rate based on either font or paper color.

Buttle and Thomas conducted a study that measured the response rates to mail questionnaires based on two paper colors, pastel yellow and white. Buttle and Thomas explain that the study set out to determine methods to improve mail survey response rates and was based on Reed's comments "that government officials determined that yellow mail questionnaires give the highest percentage of returns, with pink next in effectiveness and dark colors producing smaller returns."[12]

Buttle and Thomas mailed the surveys to managing directors in organizations with accompanying directions. Buttle and Thomas found that while yellow did return more questionnaires than white, the amount returned was not significantly higher than that of white questionnaires.

[12] V. Reed, Planned Marketing (1929), NY: Ronald Press, quoted in Francis Buttle and Gavin Thomas, Questionnaire colour and mail survey response rate, Journal of the Market Research Society 39, no. 4 (October 1997): 625.

METHODOLOGY: EXPERIMENT 1

VARIED FONT COLOR TEST

In an effort to determine correlation between font colors on collection notices, payment amounts, and speed of collections, an experiment was conducted by varying the font colors on the notices. The standard black was the control group. Blue and red were the font colors tested against the control group. Initially, green also would have been a font color, however, due to time and budgetary constraints, green was eliminated. Regional tendencies were tracked to measure any variance in response and liquidation rates based on the font color. Liquidation is defined as the dollars recovered by the list balance on the account, or the amount written off by the test company's client. Liquidation percentages are the measurements used to determine materiality during the test. Even a small percentage change equates to material financial gains.

Materiality was determined by testing the difference between the proportions of the mailings (refer to equations for materiality in Appendix 1). The null hypothesis in the font color test assumes that there is no difference between the control group and the font colors. The control group does not have a null hypothesis. The reason for not testing the control group is that previous solicitations of this magnitude have not been done on like inventories. Therefore, any null hypothesis would have been speculative. It is recognized that testing for a null hypothesis on the control group could have merit, but that would be outside the scope of this research.

If correlation could be found between font color, response, and collection speed, utilizing this data could enhance liquidation for the test company. This utilization

would give the test company a competitive advantage[13]. This advantage could yield positive competitive positioning in an industry where competitive differences are often measured in tenths, or even hundredths, of a percentage point.[14]

[13] Typically, the cost of adding a color font to a mass mailing letter is $0.02 per letter to $0.03 per letter, and using a color sheet is less than $0.01 per letter. If liquidation rate increases generate more revenue than that cost, then the use of color fonts and/or color sheets would be profitable.

[14] For this test, as well as the subsequent paper color test, incremental change in comparison to the control group is measured. Therefore, the largest incremental change to the control group is discussed. This does not discount the other, often statistically significant, color performance. In addition, superior color performance (non control) compared to inferior color performance (non control) is not considered.

ANALYSIS: EXPERIMENT 1

POPULATION

The population selected was comprised of accounts that had been listed between 2 and 20 months with the test company and comprised of various hold statuses deemed appropriate for further mailings. Accounts with a status deemed inappropriate for mailing (e.g., bankruptcy, fraud, disputed debts) were removed. The population consisted of 241,207 accounts and was distributed among 11 States where the debt was incurred. Of the 241,207 records, 596 notices, or approximately 0.3% of the total sample, were suppressed by the mail vendor for various reasons including licensing considerations and balance size. The remaining population of notices sent was 240,611. The population contained font color distributions as seen in Table 1. Those notices removed via the mail vendor and those returned to the test company as undeliverable (described below) were removed from the sample. These must be removed from the samples, as the influence to pay is not present if the notice does not reach the debtor.

Since all notices were produced through a computer program that supposedly assigned notice color randomly, there was no apparent reason for the increased number of red font notices versus the black and blue. It was determined that even though the red notices accounted for a greater amount of the total population, that this did not represent a marked deviation from the test. In addition, the accounts selected for the red notices were selected at random and in a fashion that would show those accounts did not have a greater propensity to pay.

In addition, the font color test included accounts that also were being worked via 'phone calls as a medium for contacting the debtor. The notices went out on accounts that were comprised of 77% inactive and 23% active. An active account refers to those accounts that are in an inventory that is being worked to some degree while inactive accounts refers to accounts that are not in an inventory and are not currently being pursued. Of those accounts that were active (recall 23% were active), 82% of the active accounts were listed in the last two months of 2001, which were the last two months included in the test. Of those accounts that were active, phone calls were random with respect to the notices. Whether varying of the font color is determined to be more or less effective, occurring in tandem with phone calls, is reserved for future research.

UNDELIVERABLE MAIL

To accurately measure the results, those notices that were undeliverable were removed from the statistical tracking. For the total notices sent, 21.2% were undeliverable due to standard post office undeliverable mail reasons via standard return mail procedures. The three font colors had the undeliverable mail percentages as seen in Table 1.

The percentage of undeliverable mail by State and color standard deviations were considered in the event that one State had a higher standard deviation and one color had an unequal distribution of valid addresses, therefore having the possibility of influencing liquidation potential.

Table 1: Font Color Study Mail Statistics[15]

State	Color	Notices Sent	No. of Notices Undeliverable	Return Mail %	No. of Notices Delivered	Return Mail Standard Deviation %
State 1	Black	19,076	4,448	23.3	14,628	
	Blue	19,112	4,544	23.8	14,568	
	Red	22,256	5,421	24.4	16,835	
	Total	**60,444**	**14,413**	**23.9**	**46,031**	**0.5**
State 2	Black	11,321	2,393	21.1	8,928	
	Blue	11,317	2,495	22.0	8,822	
	Red	13,180	2,903	22.0	10,277	
	Total	**35,818**	**7,791**	**21.8**	**28,027**	**0.5**
State 3	Black	10,995	2,200	20.0	8,795	
	Blue	10,996	2,242	20.4	8,754	
	Red	12,888	2,554	19.8	10,334	
	Total	**34,879**	**6,996**	**20.1**	**27,883**	**0.3**
State 4	Black	8,858	1,671	18.9	7,187	
	Blue	8,862	1,658	18.7	7,204	
	Red	10,349	1,891	18.3	8,458	
	Total	**28,069**	**5,220**	**18.6**	**22,849**	**0.3**
State 5	Black	7,750	1,486	19.2	6,264	
	Blue	7,724	1,609	20.8	6,115	
	Red	8,985	1,803	20.1	7,182	
	Total	**24,459**	**4,898**	**20.0**	**19,561**	**0.8**
State 6	Black	5,425	1,069	19.7	4,356	
	Blue	5,392	1,111	20.6	4,281	
	Red	6,306	1,271	20.3	5,035	
	Total	**17,123**	**3,451**	**20.2**	**13,672**	**0.5**
State 7	Black	3,771	682	18.1	3,089	
	Blue	3,741	668	17.9	3,073	
	Red	4,447	818	18.4	3,629	
	Total	**11,959**	**2,168**	**18.1**	**9,791**	**0.3**
State 8	Black	4,938	1,114	22.6	3,824	
	Blue	4,943	1,096	22.2	3,847	
	Red	5,721	1,388	24.3	4,333	
	Total	**15,602**	**3,598**	**23.1**	**12,004**	**1.1**
State 9	Black	1,854	362	19.5	1,492	
	Blue	1,835	369	20.1	1,466	
	Red	2,181	498	22.8	1,683	
	Total	**5,870**	**1,229**	**20.9**	**4,641**	**1.8**
State 10	Black	1,334	269	20.2	1,065	
	Blue	1,345	319	23.7	1,026	
	Red	1,546	360	23.3	1,186	
	Total	**4,225**	**948**	**22.4**	**3,277**	**1.9**
State 11	Black	678	101	14.9	577	
	Blue	701	113	16.1	588	
	Red	784	138	17.6	646	
	Total	**2,163**	**352**	**16.3**	**1,811**	**1.4**
Total	Black	76,000	15,795	20.8	60,205	
	Blue	75,968	16,224	21.4	59,744	
	Red	88,643	19,045	21.5	69,598	
	Total	**240,611**	**51,064**	**21.2**	**189,547**	**0.4**

[15] Return mail standard deviation measured in Table 1 is to show the difference of return mail percentages between the various color populations. As the standard deviation of the return mail percentage increases, the possibility could exist that sample sizes for the respective color were influenced, causing the respective population to deviate from the mean population. This possibility of this deviation and its impact is reserved for future research.

LIQUIDATION

Liquidation is the most important measurement in the receivables industry. Therefore, it was appropriate that the measure of response based on font color was measured by liquidation using a percentage of the listing balance. Liquidation was measured on two return measures. The first measurement was total liquidation percentage. That is, what was the total amount recovered compared to the total listing balance of the font color accounts for the notices that reached debtors. Secondly, speed of liquidation also was considered as a measurement in the event all colors produced statistically the same final liquidation but in varying intervals.

Liquidation was measured for 105 days after the mailing of the notices. These measurements are summarized[16] below and were chosen from similar points during the . After 15 days, there was no marked difference in the liquidation of the total portfolio for the varying font colors with liquidation being 0.8% for all colors. After 30 days, little dispersion began with the black font reaching 1.6%, blue reaching 1.6%, and red font liquidation reaching 1.7%. After 60 days, the population had identical liquidation rates 2.6% for black font, blue font, and red font. At 90 days, liquidation rates remained similar for the fonts with black liquidating 3.2%, blue liquidating 3.1%, and red liquidating 3.3%.[17] At 105 days, the separation between red and the control group was

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[16] Since the observations viewed are in percentages near the 1% mark, the election to report statistical significance by 99% versus the alternative 1% was made to limit reader confusion. In addition, all significance in the paper is a 99% level unless expressly noted.

[17] While the incremental difference between red and blue is 0.2%, discussed is black:blue and black:red relationships. Recall footnote 14, the observation considered is the greatest incremental change from the control as opposed to change from alternate colors (in this case the red:blue relationship) in the study.

consistent with black liquidating at 3.4%. Blue liquidated statistically lower at 3.3%, significant at 99%. Red liquidated statistically higher at 3.5%.[18]

INDIVIDUAL STATE OUTCOMES

With the results of the total population showing limited dispersion in liquidation, further analysis was done by State to determine if there was any State disparity. Color preferences by State could be determined through comparing liquidation on font colors by State to determine dispersion between the colors and the control group.[19] The findings based on font color varied from the total population in that dispersion was found by font color. Interestingly enough, variation in liquidation was even found between neighboring States with some States having consistency in which fonts liquidated the most and others showed converse relationships between the font colors.

State 1, the control group performed below the blue and red fonts by 0.1% after the 105 day test. Black liquidated at 2.8%, blue and red liquidated amounts statistically significant compared to the control group with blue liquidating 2.9% and red liquidating 2.7%.

Six of the eleven States showed higher liquidation when red fonts were used. Liquidation of State 10, State 9, State 2, State 4, State 7, and State 11 were consistently above those logged by their control groups. As shown in Table 2 below, black font

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[18] To view liquidation percentages for the total population, refer to Appendix 3: Table 8. A pictorial representation of liquidation percentages is included in Appendix 4: Graph 12.

[19] To view liquidation percentages for individual States, refer to Appendix 3: Table 8. A pictorial representation of liquidation percentages is included in Appendix 4: Graph 1:Graph 11.

liquidation was most frequently outperformed by red font liquidation over the period of the test. For example, in State 10 by day 30, the control font liquidated at 1.5% and the red font liquidated at 2.6%, or 1.1% above the control.

Table 2: Red Font Liquidation Comparisons to the Control Group[20]

State	Percentage Gain Day 30	Percentage Gain Day 45	Percentage Gain Day 60	Percentage Gain Day 75	Percentage Gain Day 90	Percentage Gain Day 105	Red Font Z Score at Day 105
State 10	1.1	0.8	0.8	1.2	1.3	1.3	23.4*
State 9	(0.1)	0.0	0.5	0.6	0.6	1.2	23.3*
State 2	0.1	0.2	0.3	0.3	0.4	0.3	19.7*
State 4	0.1	0.3	0.3	0.4	0.3	0.2	14.6*
State 7	0.3	0.3	0.4	0.3	0.4	0.3	11.3*
State 11	0.0	0.2	1.0	0.4	0.4	0.3	4.5*

** Significant at 99%*

Significant at 95%, the blue font in State 4 and State 10 also performed marginally above that of the control group, liquidating 0.3% and 0.2% respectively. State 2's blue font performed consistent with that of the control group throughout the life of the test. The remaining States of State 9, State 7, and State 11 saw statistically significant lower liquidation for blue fonts when compared to the control group of 1.2%, 0.5%, and 1.8% respectively.

The States of State 6, State 5, State 3, and State 8 saw varied font colors perform worse or consistent with that of the control group. In State 6, the blue performed 0.2% below the control group with red performing 0.1% below, both statistically significant. In State 5, the blue and red fonts performed below that of the control group by 0.2% and

[20] Percentage gain refers to the incremental liquidation percentage gained over the liquidation percentage of the control group. For example, if red font liquidated at 2.9 and the control liquidated at 1.9, a 1.0 gain was recognized.

0.1% respectively, both statistically significant. State 3's fonts performed slightly below that of the control group for blue and red font. Blue font liquidated less than .1% below the control group, 95% significance, with red liquidating less than .1% below the control group, statistically significant. In State 8, both the blue and red font performed statistically significant below that of the control group by 0.4% and 0.3% respectively.

When considering the total value of the population and the varying liquidation by font colors, the impact of the top-liquidating font was reviewed to get a grasp of the measurable results through modifying font by State. To measure the impact, the higher font liquidation percentage for that State was used and applied to the other sample sizes for that State. The list amount was then multiplied by the incremental difference in liquidation. The dollar amount and numbers, shown below, indicate the estimated benefit of utilizing varying fonts by State for this population. Also shown below is the impact of changing fonts across the total portfolio, that is, standardization of color across the entire portfolio with no regard to State variations.

Table 3 shows the differences between using state specific font preferences versus using population font preferences.

Table 3: Liquidation Gain Potential by State Specific Color Utilization

	Increased Recovery Dollars	Liquidation Percentage Impact
Portfolio standardization	$ 45,841	0.1
State specific fonts	$102,764	0.1

The utilization of State specific font colors, specifically using the top performing font color, would have had a positive impact on collections of roughly $103,000 over the length of the test (approximately 3 months).[21] It also showed that by using red as a consistent font color on the notices, some increase in liquidation would have been realized.

[21] Recall in Footnote 13 that a competitive advantage would be gained by collecting amounts greater than the incremental cost of the notices.

METHODOLOGY: EXPERIMENT 2

PAPER COLOR STUDY

A second test was done to determine correlation between the color of the notice paper as a variable, payment amounts, and speed of payments. The test was conducted by varying the notice colors between the standard white (control group), blue, green, and red. On all notices, font color was held constant at black. To accounts for regional preferences, States were tracked to measure any variance in response and liquidation based on geographical preferences. Similar to the varied font color data, if correlation could be found between paper color, response, and liquidation speed, employment of this data also could be used to increase liquidation.

Statistical significance was determined by testing the difference between the proportions of the two samples.[22] The null hypothesis in the paper color test assumes that there is no difference between the control group and the alternative paper colors. For the paper color study, the control group's null hypothesis is based on liquidation percentages obtained from previous comparable dun mailings on like inventories. By using a prior "similar" control, testing is far more rigorous than using a null of zero.

It should be noted however, that the similar dunning event was conducted in the year 2001 when the economy was strong. In 2002, the economy is weak, bankruptcies are increasing, write-offs are increasing and the 2002 dunning test competed for disposable income that had many other obligations in the same weak economy.

[22] Equations used to determine statistical significance are included in Appendix 1.

Therefore, while materiality of the control group is tested in this manner, consideration must be given to the changes in economic conditions.

ANALYSIS: EXPERIMENT 2

POPULATION

The population chosen included accounts that had been listed between 21 and 38 months, with the test company. Similar to the font color study, the accounts were comprised of various statuses that were appropriate for additional notices. Again, those statuses of bankruptcy, fraud, dispute, etc., were removed from possible accounts to receive the notices. The paper color population contained 245,098 accounts that were distributed among 10 States where the debt was incurred. The population contained paper color distributions as seen in Table 4. Of the 245,098 records, 431 duns, or 0.2% of the total population, were suppressed by the mail vendor for State licensing considerations and balance size issues. Recall that the font color test began with notices being sent, before undeliverables were removed, of 240,611.

Again, the notices suppressed by the notice vendor and those notices returned as undeliverable, specified subsequently, were removed from the study for reasons mentioned previously.

All notice paper designations were produced through a computer program. After the font color program was run to produce font color notices with red font receiving a proportionally higher amount of notices identified and sent, the program was monitored to ensure that numbers were consistently applied.

UNDELIVERABLE MAIL

As with the font color study, undeliverable mail was tracked to remove those letters from the sample size on both the number of accounts, in addition to, dollars listed. Of the entire population, 42.2% of the notices were undeliverable. This higher percentage compared to the varied font color study can be accounted for by the age of the accounts.[23] The undeliverable mail data for each of the paper colors specifically can be seen in Table 4.

Again, the distribution of undeliverable mail percentages for the various paper colors did not cause any statistical problems for bias color selection, and thereby cause the study to be invalid. In addition, the percentage of return mail by State and color standard deviations also was observed with the paper test. In the event that one State had higher standard deviation or one color had an unequal distribution of good notices, the possibility of undeliverable mail influencing liquidation statistics could be possible. The undeliverable mail of State 13 [24] has the possibility of influencing the results. This State is unusual because the standard deviation is high as well as a high population, while other States have lower standard deviations and lower populations. State 13's blue paper had the lowest undeliverable mail with the undeliverable percentages as calculated by using the numbers in Table 4. The blue paper for State 13 also performed highest as seen in Table 9. In other States, the return mail percentages by color showed

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[23] Reference to age of accounts in this instance is from time of listing with test company to time of mailing. Industry definition of account age is the days between dates of account write off from the client to date of placement with the collection agency.

[24] Refer to Appendix 2: Table 7 for the State relationship table between the font and paper test.

no correlation to the color with the highest liquidation percentages. For example, State 17's white paper had a return mail percentage of 42% while other colors had lower percentages returned. However, white, for State 17, did not have the highest liquidation amount, red paper did.

LIQUIDATION

As with the font color study, the appropriate measure of response based on color paper was liquidation expressed as a percentage of the listing balance. Liquidation was measured on the two return measures as in the font color study. To reiterate, the first measurement was total liquidation percentage, being the total amount recovered compared to the total listing balances of the color paper for the notices that reached debtors. Secondly, speed of liquidation also was considered as an important measurement in the event all colors produced statistically the same liquidation but in varying intervals.

Liquidation was measured for 90 days after the notice mailing. These measurements are summarized below and were chosen from points during the test. After 15 days of the test, all colors had fallen below liquidation marks of the control group by 0.1% for blue, green is less than 0.1%, and red is 0.2%. At this point, white, blue, and green each liquidated at 0.6%, 0.6%, 0.6%, while red liquidated at .5%. At 15 days, the control group liquidated above the other colors by a statistically significant

Table 4: Paper Color Study Mail Statistics

State	Color	Notices Sent	No. of Notices Undeliverable	Return Mail %	No. of Notices Delivered	Return Mail Standard Deviation %
State 12	White	15,787	6,211	39.3	9,576	
	Blue	15,741	6,194	39.3	9,547	
	Red	15,727	6,221	39.6	9,506	
	Green	15,757	6,158	39.1	9,599	
	Total	**63,012**	**24,784**	**39.3**	**38,228**	**0.2**
State 13	White	10,743	5,369	50.0	5,374	
	Blue	10,731	5,187	48.3	5,544	
	Red	10,740	5,357	49.9	5,383	
	Green	10,756	5,313	49.4	5,443	
	Total	**42,970**	**21,226**	**49.4**	**21,744**	**0.8**
State 14	White	9,000	3,889	43.2	5,111	
	Blue	9,005	3,977	44.2	5,028	
	Red	8,993	3,948	43.9	5,045	
	Green	9,012	3,955	43.9	5,057	
	Total	**36,010**	**15,769**	**43.7**	**20,241**	**0.4**
State 15	White	7,305	3,120	42.7	4,185	
	Blue	7,278	3,066	42.1	4,212	
	Red	7,286	3,102	42.6	4,184	
	Green	7,305	3,062	41.9	4,243	
	Total	**29,174**	**12,350**	**42.3**	**16,824**	**0.4**
State 16	White	7,268	2,847	39.2	4,421	
	Blue	7,255	2,804	38.6	4,451	
	Red	7,237	2,857	39.5	4,380	
	Green	7,256	2,853	39.3	4,403	
	Total	**29,016**	**11,361**	**39.1**	**17,655**	**0.4**
State 17	White	5,752	2,413	42.0	3,339	
	Blue	5,758	2,338	40.6	3,420	
	Red	5,729	2,336	40.8	3,393	
	Green	5,764	2,391	41.5	3,373	
	Total	**23,003**	**9,478**	**41.2**	**13,525**	**0.6**
State 18	White	2,872	1,092	38.0	1,780	
	Blue	2,850	1,041	36.5	1,809	
	Red	2,850	1,068	37.5	1,782	
	Green	2,860	1,034	36.2	1,826	
	Total	**11,432**	**4,235**	**37.0**	**7,197**	**0.9**
State 19	White	1,344	534	39.7	810	
	Blue	1,338	566	42.3	772	
	Red	1,334	560	42.0	774	
	Green	1,330	565	42.5	765	
	Total	**5,346**	**2,225**	**41.6**	**3,121**	**1.3**
State 20	White	806	313	38.8	493	
	Blue	802	331	41.3	471	
	Red	800	325	40.6	475	
	Green	800	335	41.9	465	
	Total	**3,208**	**1,304**	**40.6**	**1,904**	**1.3**
State 21	White	376	156	41.5	220	
	Blue	372	137	36.8	235	
	Red	372	149	40.1	223	
	Green	376	144	38.3	232	
	Total	**1,496**	**586**	**39.1**	**910**	**2.0**
Total	White	61,253	25,944	42.4	35,309	
	Blue	61,130	25,641	41.9	35,489	
	Red	61,068	25,923	42.4	35,145	
	Green	61,216	25,810	42.2	35,406	
	Total	**244,667**	**103,318**	**42.2**	**141,349**	**0.2**

level.[25] After 30 days, the distribution had shifted slightly with blue and green ending with liquidation marks over the control group of less than 0.1% for both colors. Red returned continued lower liquidation with red liquidating below the control group by less than 0.1%. While tightness existed through day 30, dispersion began to occur between the liquidation of the control group and the paper colors of green and red. Dispersion of the blue color did not occur until 10 days before the conclusion of the test. Statistically significant, white liquidated materially lower at 2.4% at 90 days with the null hypothesis being 2.5%.[26] All other colors performed materially above the control, white paper, group. Statistically significant, blue liquidated at 2.5%, green liquidated at 2.6%, and red liquidated at 2.5%. Again, as found with the varied font color study, the difference in overall liquidation dispersion was more apparent by State.[27]

INDIVIDUAL STATE OUTCOMES

With significant variation seen in liquidation between colors for the population, additional analysis was again done by State to detect any trends in regional color

[25] The liquidation amounts at day 15 are statistically significant with decimals expanded to hundredths. However, for the purposes of this paper, they have been brought down to tenths.

[26] Recall the control group's null hypothesis was calculated using liquidation percentages from a previous dunning event in 2001. This is more rigorous than setting null equal to zero.

[27] To view liquidation percentages for the total population, refer to Appendix 5: Table 9. A pictorial representation of liquidation percentages is included in Appendix 6: Graph 23.

preference.[28] As with the font color study, State specific preferences were found. As with the font color study, preferences were found regionally between neighboring States, with at times, no color clustering. The most interesting finding is that with the paper color study, while the control group outperformed various colors of paper by State, it never liquidated more than all colors tested during the project in a given State.

The color of red performed materially better than the control in five States. Measured in terms of incremental percentage change in liquidation, red performed above the control group in State 21 an incremental 1.9%, State 17 an incremental 0.6%, State 19 liquidating an incremental 0.4%, State 12 by 0.3%, and State 14 an incremental 0.1%. All of these liquidation amounts are statistically significant. In these States, red,

Table 5: Red Paper Liquidation Comparisons to the Control Group[29]

State	Percentage Gain Day 30	Percentage Gain Day 45	Percentage Gain Day 60	Percentage Gain Day 75	Percentage Gain Day 90	Red Paper Z Score at Day 90
State 21	0.3	1.3	1.3	1.4	1.9	29.3*
State 17	(0.1)	(0.1)	0.3	0.2	0.6	19.8*
State 19	(0.2)	0.3	0.0	0.0	0.4	6.85*
State 14	(0.2)	0.0	0.1	0.0	0.1	3.84*

** Significant at 99%*

while consistently strong, did not perform the best in the early running (through the first 30 days of the test). During this time, often other colors were performing slightly above

[28] To view liquidation percentages for individual States, refer to Appendix 6: Table 9. A pictorial representation of liquidation percentages is included in Appendix 6: Graph 13:Graph 22.

[29] Percentage gain refers to the incremental liquidation percentage gained over the liquidation percentage of the control group. For example, if red font liquidated at 2.9 and the control liquidated at 1.9, a 1.0 gain was recognized.

red. Of particular interest is the variation between State 17, State 18, State 19, and State 20. These States are similar in liquidation trends for many portfolios as the consumer base is quite similar. However, overall liquidation based on paper color varied between them for blue and red paper.[30]

In State 12, over time, blue and green performed consistently near the control group, ending nearly even with the control group; an immaterial financial difference, however, blue was statistically significant. Green was not significantly different. State 17 showed mixed results on other color performance with blue and green both liquidating slightly above the control group but neither being statistically significant. State 14 saw a decreased performance for blue and green except with more radical variation as blue liquidated 0.4% below the control group and green performed 0.1% below that of the control group. Both of these being statistically significant. The blue paper in State 19 showed ability to liquidate above the control group through day 45 but ended significantly below the control group by 0.2%. Green also finished below the control group by 0.1% after seeing a large gap, similar to blue, over the control group midway through the test. The difference being significant at the 95% level.

State 16 performed the highest with the green colored paper liquidating at 0.4%, which is statistically significant over the control group. Green's liquidation over the control group, blue, and red, was established early and was consistent. White, blue and red all performed consistently varying throughout the duration of the test. Blue ended less than 0.1% above the control group and red ended below by less than 0.1%. Neither

[30] Refer to Appendix 5: Table 9 to review the liquidation for theses States through the duration of the test.

white, nor blue, nor red are statistically significant. State 15 also saw green perform significantly above the control group by 0.2%. However, the colors of blue and red both performed below the control group by 0.6% for each, both statistically significant.

The States of State 13, State 18, and State 20 showed preferences for blue colored paper. For the State of State 13 all paper colors performed significantly above that of the control group with blue liquidating 0.6% higher. Green liquidated 0.5% above the control group and red liquidated 0.3% above the control group, both statistically significant. In State 18, blue liquidated at 0.4% above the control color with green at 0.2% above, both statistically significant, and red less than 0.1% below the control group, statistically insignificant. State 20 saw a wide spread between liquidation with blue liquidating 1.5% above the control group while green liquidated at 1.1% above and red liquidated 0.5% below the control group, all statistically significant.

When considering the total value of the population and the varying liquidation by paper color, the impact of the top-liquidating paper color was reviewed to estimate measurable results through modifying paper color by State. To gauge the impact, the top paper color liquidation percentage for that State was used and applied to the other sample sizes for that State. The list amount was then multiplied by the incremental difference in liquidation. The numbers, shown in Table 6, show the benefit of utilizing varying paper color by State for this population. Also shown below is the impact of changing paper colors across the total portfolio selected for Experiment 2, that is, standardization of paper color across the entire portfolio with no regard to State variations.

Table 6: Liquidation Gain Potential by State Specific Color Utilization

	Increased Recovery Dollars	Liquidation Percentage Impact
Portfolio standardization	$48,027	0.1
State specific fonts	$111,791	0.3

The utilization of State specific font colors, specifically using the top performing paper color, would have had a positive impact of roughly $112,000 over the length of the test. It also showed that by using green as a consistent paper color on the notices, some increased in liquidation would have been realized.

CONCLUSION

The foundation of this thesis was to test whether or not the utilization of psychographics could influence debtors in making their financial decisions. By statistically analyzing each test, certain conclusions have been determined. The use of psychographics was shown to be material and statistically significant in the collection process.

The font color test was a one time mailing of notices and showed that State preferences do exist when using varied font colors by State. The opportunity found, through the duration of the test, correlated to nearly $103,000. When considering the age of the receivables and the one time notice test, it is recommended that future research take place on new listings to validate the results of this test. Future research would need measurement guidelines and sampling put into place to measure the speed of liquidation after the first notice and subsequent notices. Given that treatment plans on new listings are not consistent (i.e., some accounts stop getting worked at varying times), tracking of treatment penetration would need to be achieved as well. Treatment penetration would measure the consistency in overall treatment penetration between font colors for a given month. For example, red font accounts and their attainment of treatment would need to be compared against blue and black to ensure like levels of treatment attainment between the varying font colors. It is recommended that future research should be ran over a one hundred and twenty day period to allow for sufficient time to allow treatment plans to progress on the accounts.

If the subsequent test validates the results of the first test, implementation should occur with random periods of measurement against a control group and possibly other colors. In addition, seasonal fluctuations may also warrant additional experimenting as climates can change emotional responses based on colors. For example, in certain midwestern States, blue may perform better in July and August because of the cool connotation offsetting the often hot and humid days encountered during this period in this region.

The paper color test created some interesting observations. The most interesting observation from the paper color study is that in all instances, States showed a preference for some color of paper over that of the control study by a significant amount. If portfolio standardization with color would have been employed, green would have been the color and would have returned approximately an additional $48,000 (over a 3 month period). However, if the top liquidating paper color would have been used solely in the individual States, an estimated additional $99,000 (over the total test collection dollars) would have been collected. This amounts to 0.3% additional in liquidation (recall footnote 13).

As with the font color study, the age of the receivables warrants another experiment to validate the performance of the portfolio under the varying paper color. While the impact on this test of 0.3% may seem negligible, when applied over an entire portfolio of receivables through the life of an account, the potential impact is financially substantial. The subsequent tests would allow support of implementation of varied paper colors for collection notices.

The tests do not support the previous research by Buttle and Thomas that concluded that paper color does not influence returns. This test did focus on a different level of receiver than that of Buttle and Thoms. Therefore, it is possible that the difference in receiver level would create response differences based on the use of psychographics.

Future research may consider the inclusion of additional demographic fields as these may enhance the results of the tests. Other account attributes, such as credit class or risk score, would assist in creating samples that are unequivocally consistent. In addition, considering additional attributes may also enhance the relevance of sampling dependant upon portfolios. While these attributes and additional demographic factors were not measured for this research, it does not imply that the samples were inconsistently similar, only that those additional factors were not measured.

The utilization of psychographics in the collection industry could enhance the financial performance of the companies that have the understanding and ability to exploit psychographics. With collections being a $15 billion dollar a year industry, even the slightest of changes in liquidation would be significant, both statistically and financially, and create an increase in recovery dollars.

APPENDIX 1

The following formulas used for to test statistical significance of the varied liquidation amounts for both the font color experiment and the paper color experiment.

Standard Deviation between two sample proportions

$$\Sigma_{p1\text{-}p2} = \sqrt{\frac{\pi\ (1-\pi)}{n_1} + \frac{\pi\ (1-\pi)}{n_2}}$$

Population Mean

$$\pi = \frac{x_1 + x_2}{n_1 + n_2}$$

Critical Value - Z

$$z = \frac{(p_1 - p_2) - (\pi_1 - \pi_2)}{\sigma_{p1\text{-}p2}} \qquad \text{Where } \pi_1 - \pi_2 = 0$$

APPENDIX 2

Table 7: State Number Sequence for Font Color and Paper Shade Tests

Font Color Notice Volume	Font Color State #	Paper Shade State #	Paper Color Notice Volume
60,444	State 1	State 12	63,012
35,818	State 2	State 15	29,174
34,879	State 3	State 14	36,010
28,069	State 4	State 16	29,016
24,459	State 5	State 17	23,003
17,123	State 6	State 13	42,970
11,959	State 7	State 18	11,432
15,602	State 8	State 21	1,496
5,870	State 9	N/A	N/A
4,225	State 10	State 19	5,346
2,163	State 11	State 20	3,208

APPENDIX 3

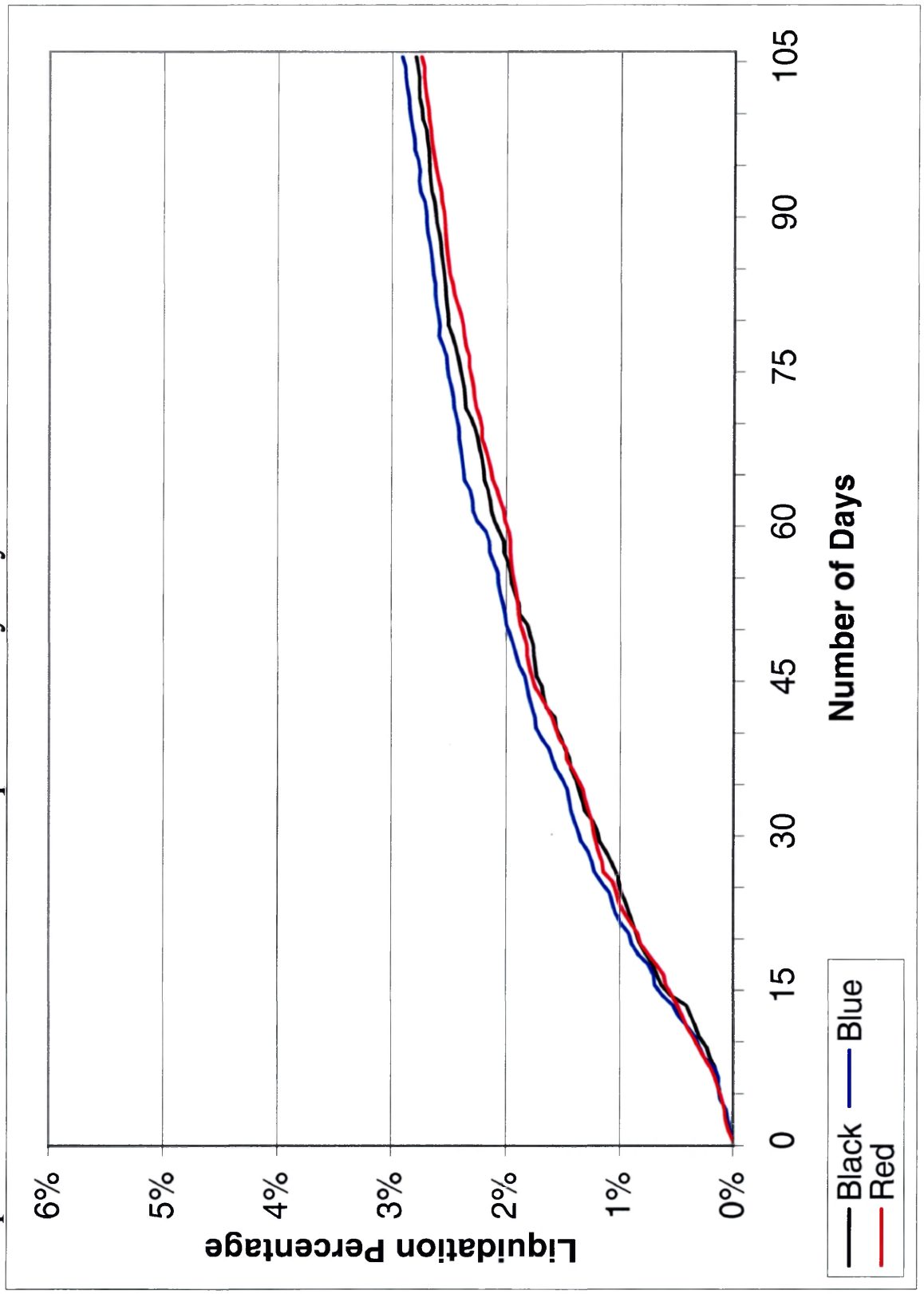
Table 8: Font Color Study Liquidation and Significance Levels

	Liquidation Percentage Day 15	Liquidation Percentage Day 30	Liquidation Percentage Day 45	Liquidation Percentage Day 60	Liquidation Percentage Day 75	Liquidation Percentage Day 90	Liquidation Percentage Day 105	Z Score	
State 1									
Black	0.6	1.2	1.7	2.1	2.4	2.6	2.8		
Blue	0.7	1.4	1.8	2.3	2.5	2.7	2.9	11.470	*
Red	0.6	1.2	1.8	2.0	2.3	2.5	2.7	-4.974	*
State 2									
Black	0.7	1.8	2.5	2.9	3.3	3.5	3.8		
Blue	0.7	1.7	2.5	2.9	3.3	3.6	3.8	-1.025	
Red	0.8	2.0	2.7	3.1	3.6	3.9	4.1	19.718	*
State 3									
Black	0.8	1.6	2.2	2.5	2.9	3.1	3.2		
Blue	0.8	1.7	2.2	2.6	2.9	3.1	3.2	-2.151	**
Red	0.6	1.5	2.1	2.5	2.8	3.0	3.2	-3.122	*
State 4									
Black	0.7	1.5	2.0	2.4	2.6	2.9	3.2		
Blue	0.7	1.6	2.2	2.7	3.0	3.1	3.2	2.253	**
Red	0.8	1.6	2.3	2.7	3.0	3.2	3.4	14.646	*
State 5									
Black	1.3	2.2	2.8	3.1	3.6	4.1	4.4		
Blue	1.3	2.0	2.5	3.1	3.6	3.9	4.2	-7.021	*
Red	1.4	2.4	3.0	3.4	3.8	4.1	4.3	-3.097	*
State 6									
Black	0.8	1.7	2.3	2.7	3.0	3.3	3.8		
Blue	0.8	1.6	2.1	2.5	2.9	3.1	3.6	-11.225	*
Red	0.8	1.8	2.3	2.6	3.0	3.4	3.7	-4.161	*
State 7									
Black	1.1	2.1	2.8	3.2	3.4	3.8	4.0		
Blue	1.2	1.9	2.3	2.6	3.0	3.3	3.4	-17.950	*
Red	1.2	2.4	3.1	3.5	3.8	4.1	4.3	11.278	*
State 8									
Black	0.6	1.3	1.7	2.1	2.4	2.7	2.9		
Blue	0.5	1.0	1.4	1.9	2.2	2.3	2.5	-20.058	*
Red	0.6	1.1	1.5	1.9	2.2	2.4	2.6	-17.166	*
State 9									
Black	1.2	2.7	3.8	4.6	5.2	5.7	5.9		
Blue	1.0	2.3	3.2	3.7	4.2	4.4	4.7	-25.760	*
Red	1.5	2.7	3.8	5.1	5.8	6.3	7.1	23.296	*
State 10									
Black	1.0	1.6	2.9	3.0	3.4	3.4	3.6		
Blue	0.8	1.6	2.7	3.3	3.4	3.5	3.7	2.290	**
Red	1.2	2.6	3.6	3.8	4.6	4.7	4.9	23.410	*
State 11									
Black	1.0	2.5	2.7	3.1	3.9	4.0	4.3		
Blue	0.7	1.7	1.8	2.1	2.2	2.4	2.5	-25.661	*
Red	1.3	2.4	2.9	4.1	4.3	4.5	4.6	4.451	*
Total Population									
Black	0.8	1.6	2.2	2.6	2.9	3.2	3.4		
Blue	0.8	1.6	2.1	2.6	2.9	3.1	3.3	-16.385	*
Red	0.8	1.7	2.3	2.6	3.0	3.3	3.5	12.622	*

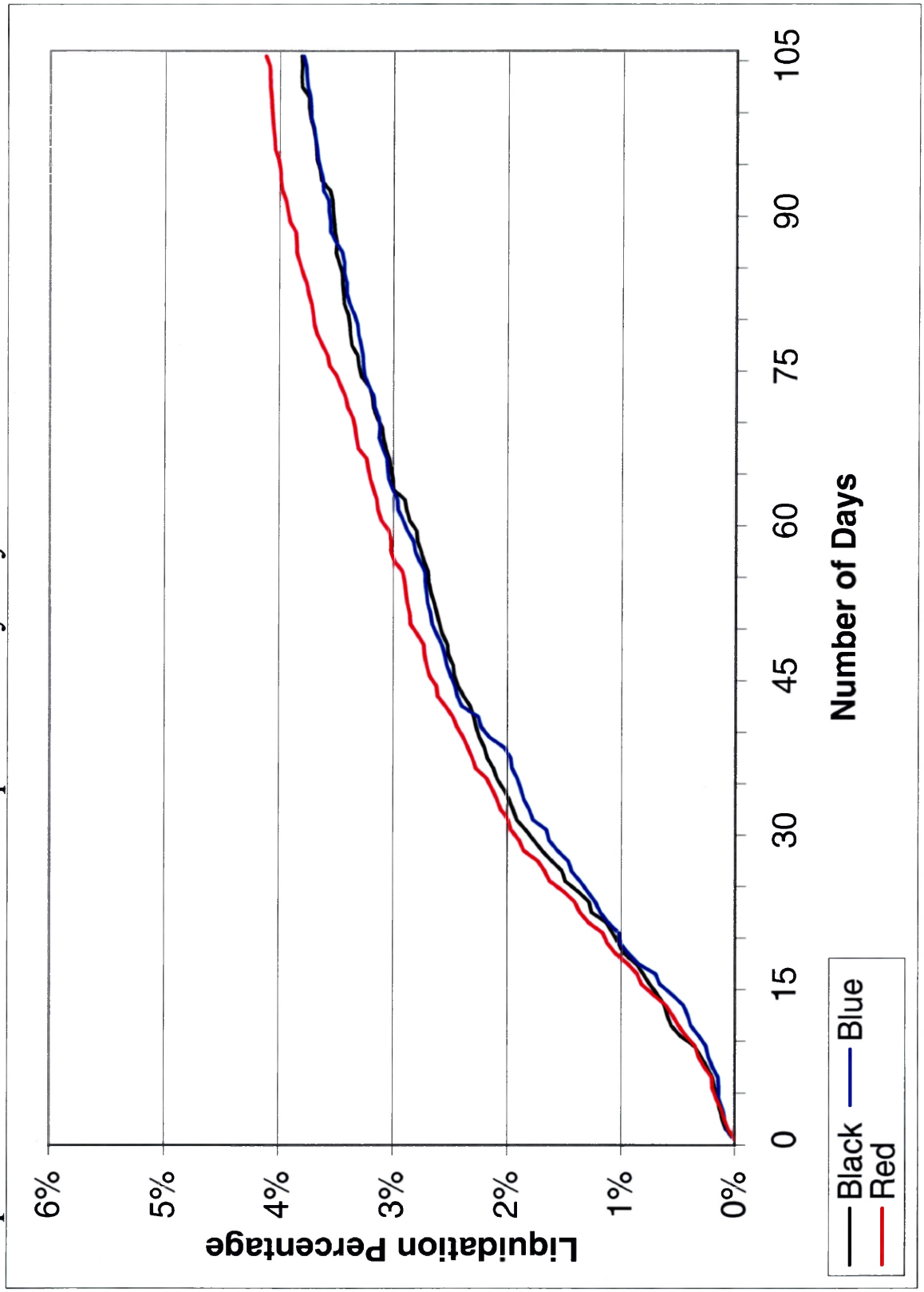
* A 99% level of signifigance.
** A 95% level of signifigance.

APPENDIX 4

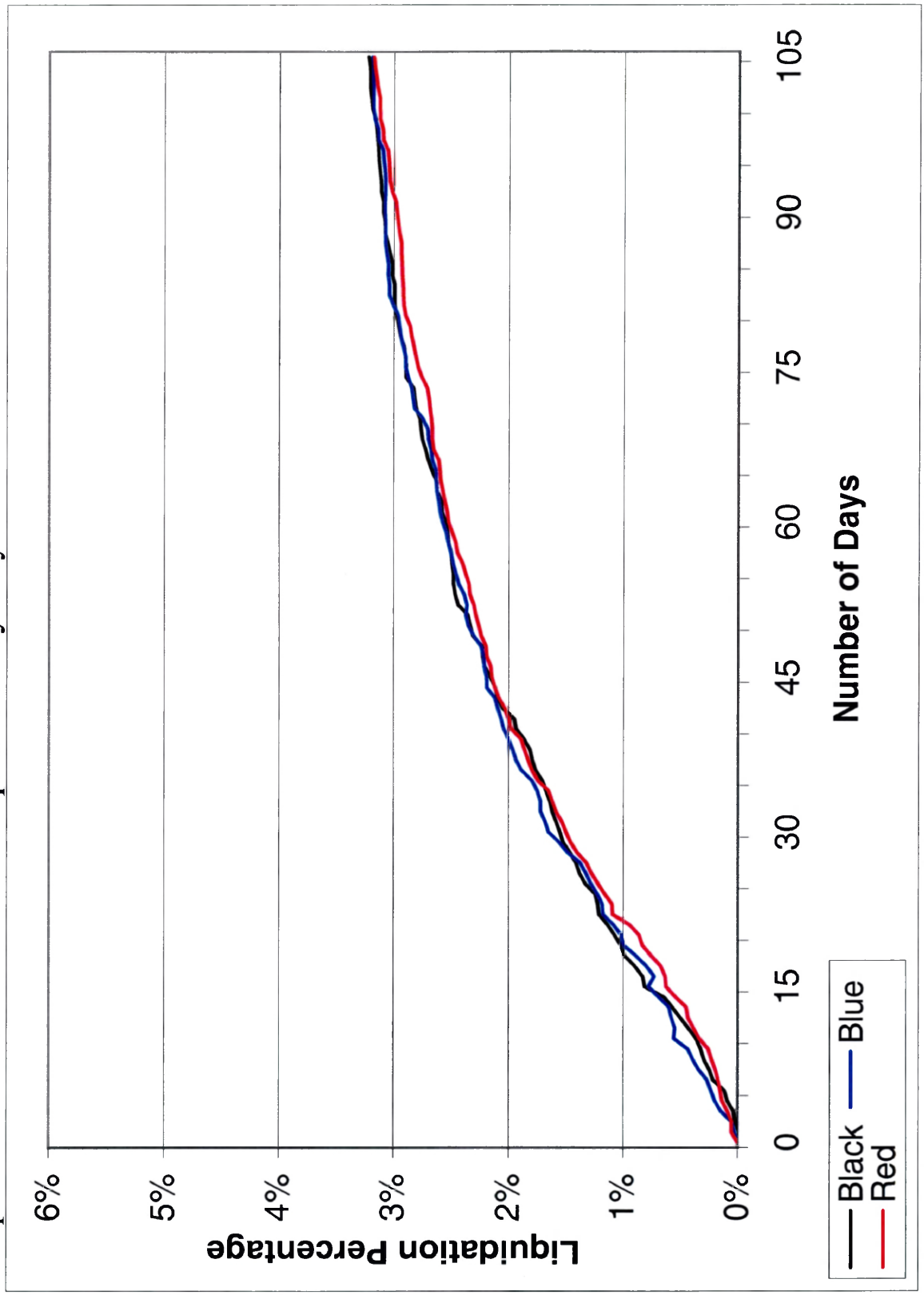
Graph 1: State 1 Font Color Liquidation by Day



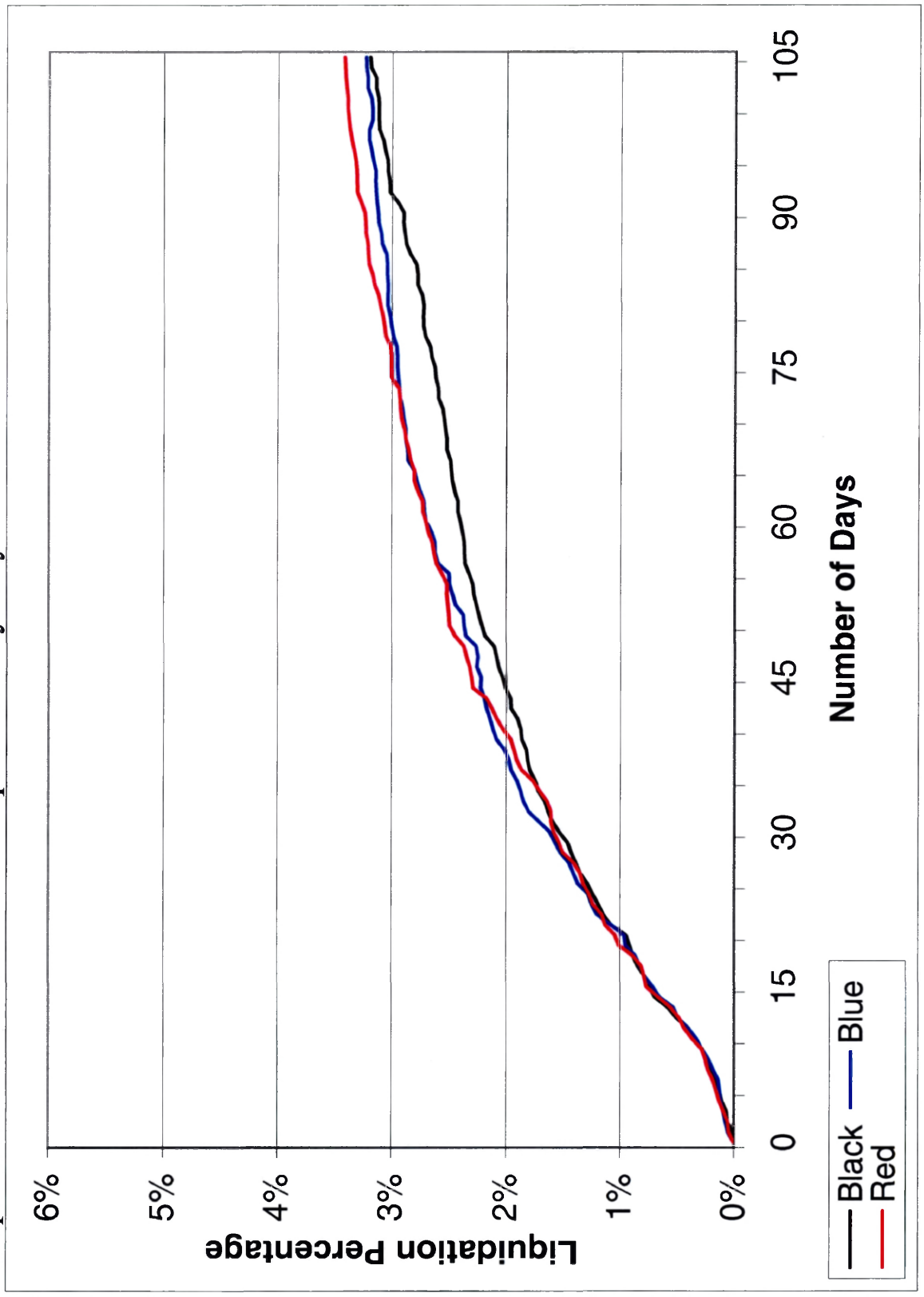
Graph 2: State 2 Font Color Liquidation by Day



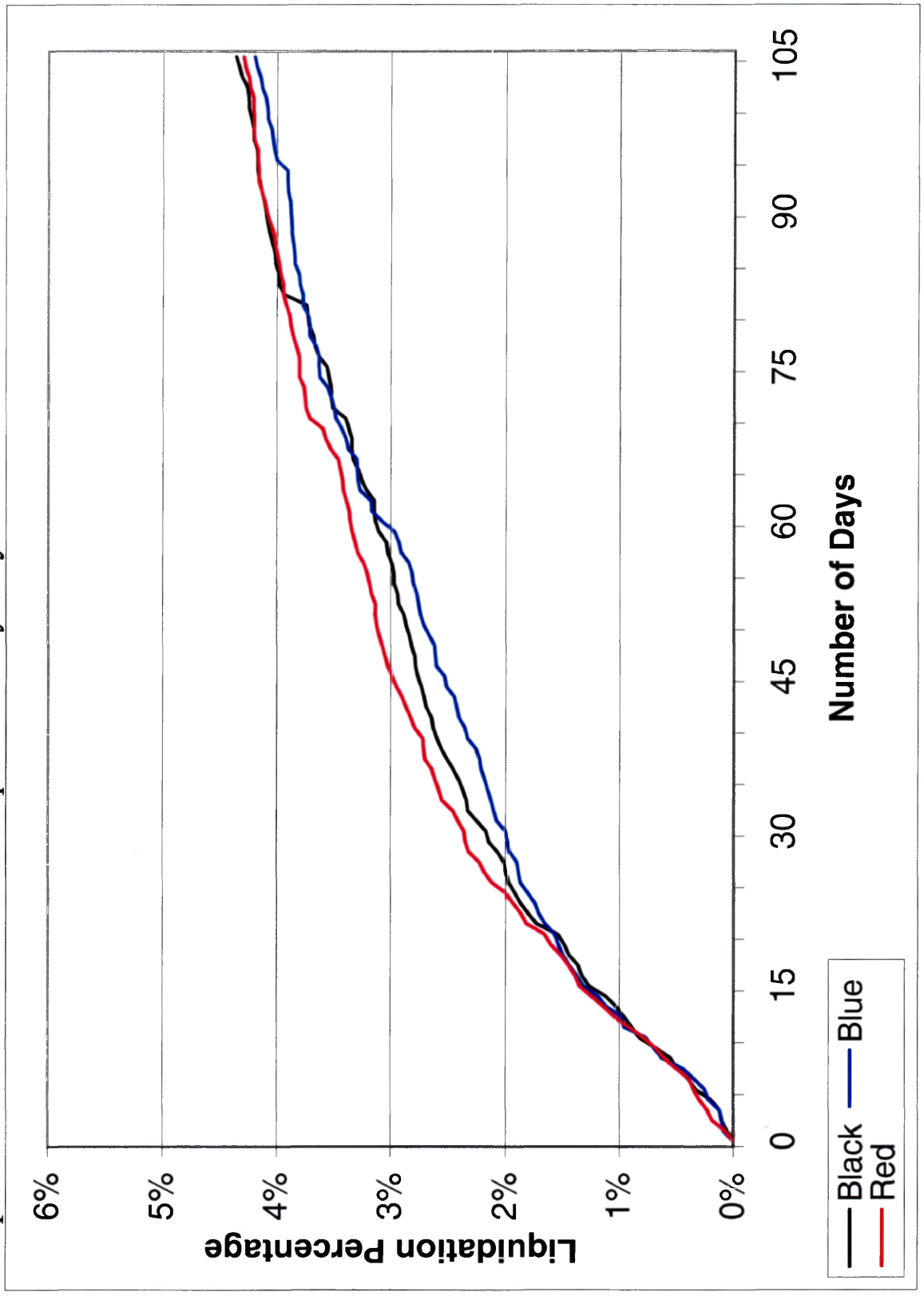
Graph 3: State 3 Font Color Liquidation by Day



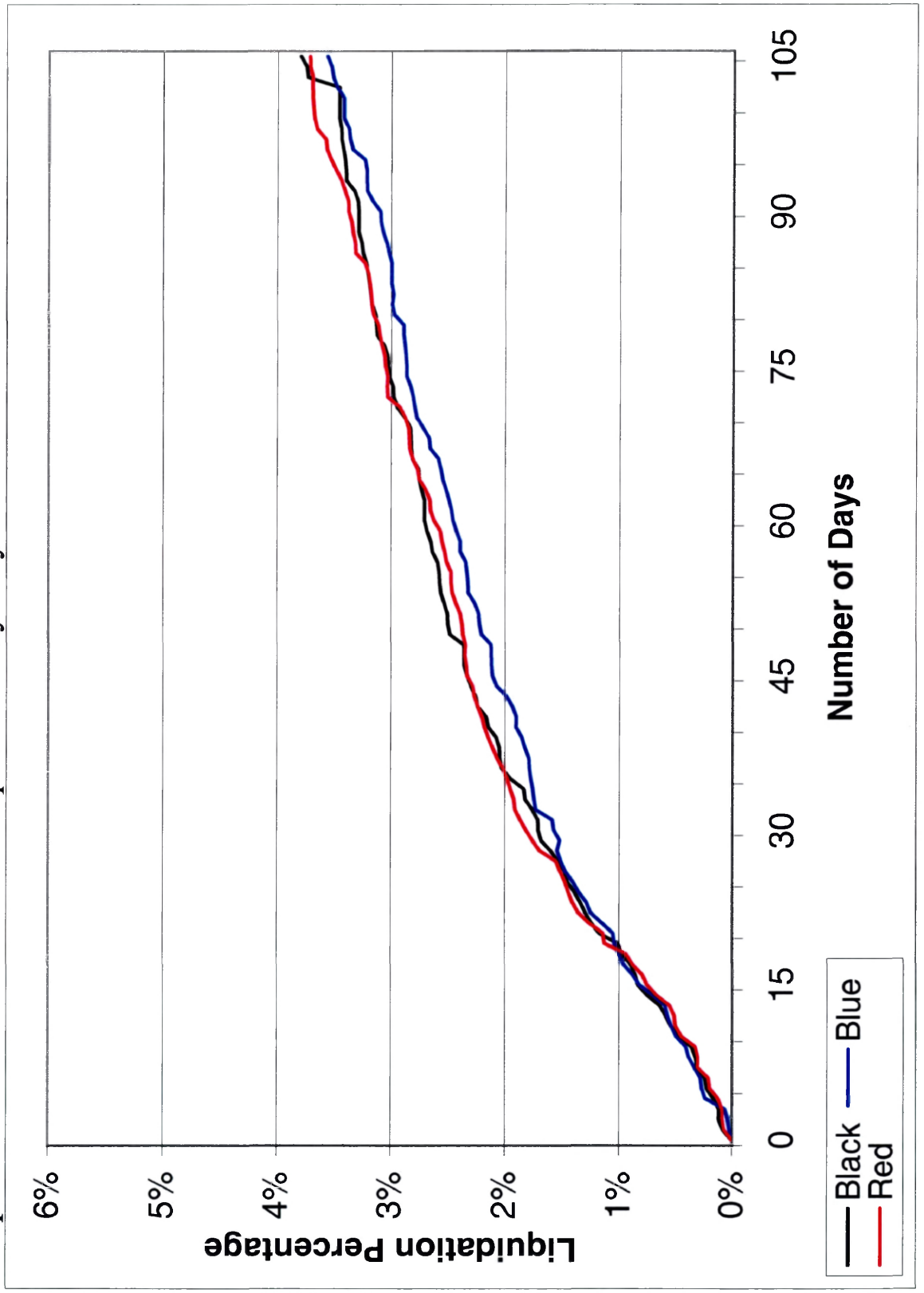
Graph 4: State 4 Font Color Liquidation by Day



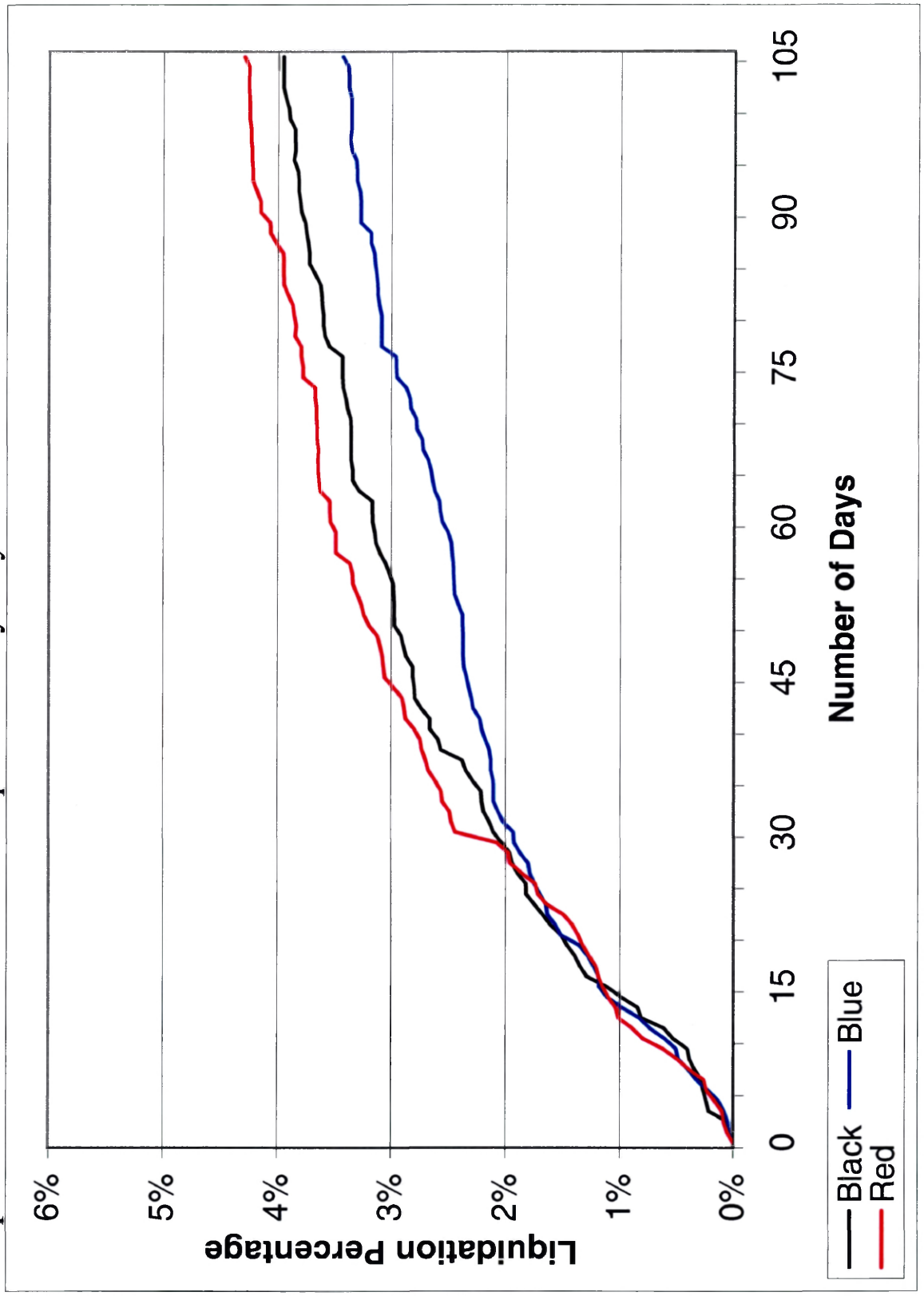
Graph 5: State 5 Font Color Liquidation by Day



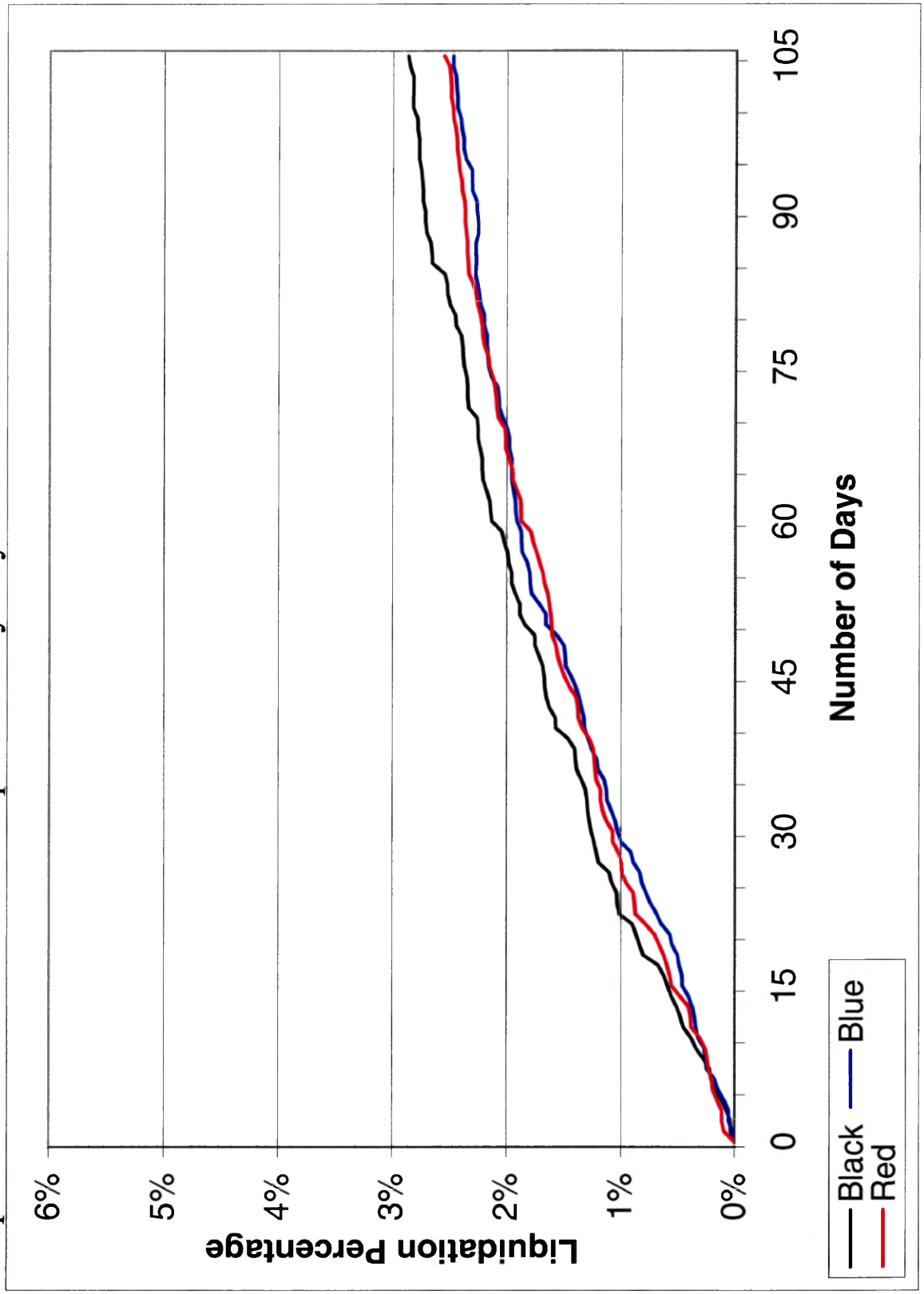
Graph 6: State 6 Font Color Liquidation by Day



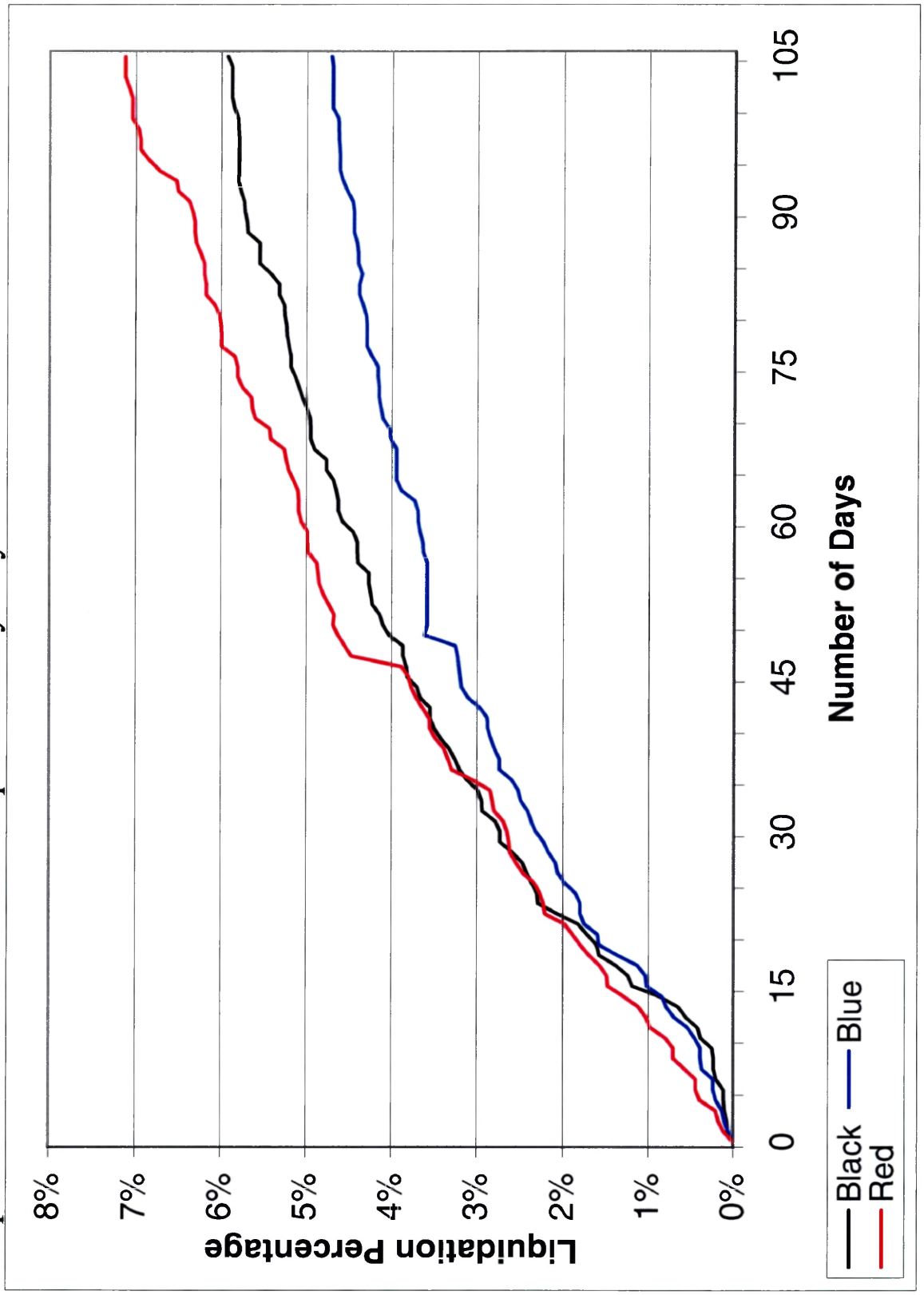
Graph 7: State 7 Font Color Liquidation by Day



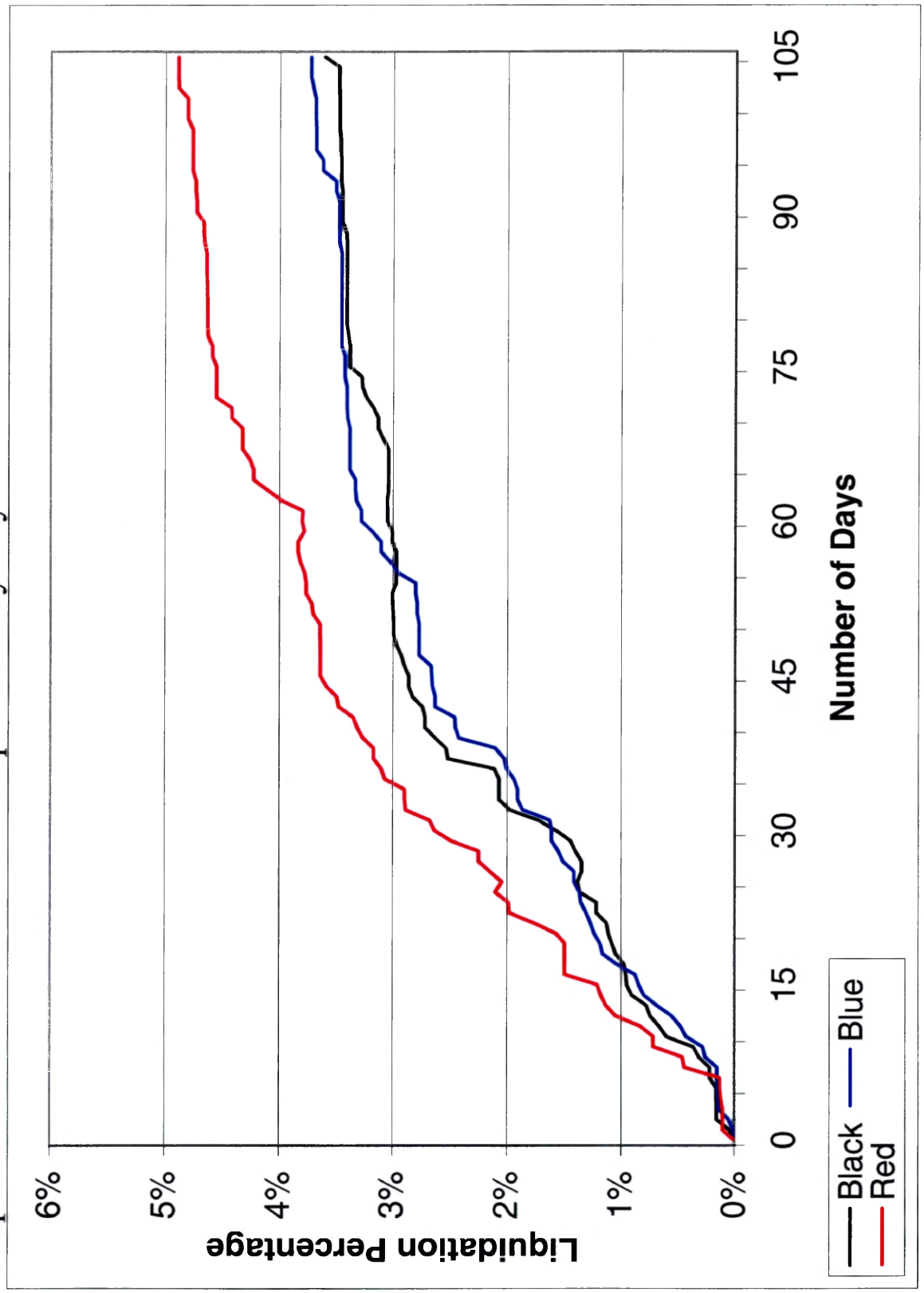
Graph 8: State 8 Font Color Liquidation by Day



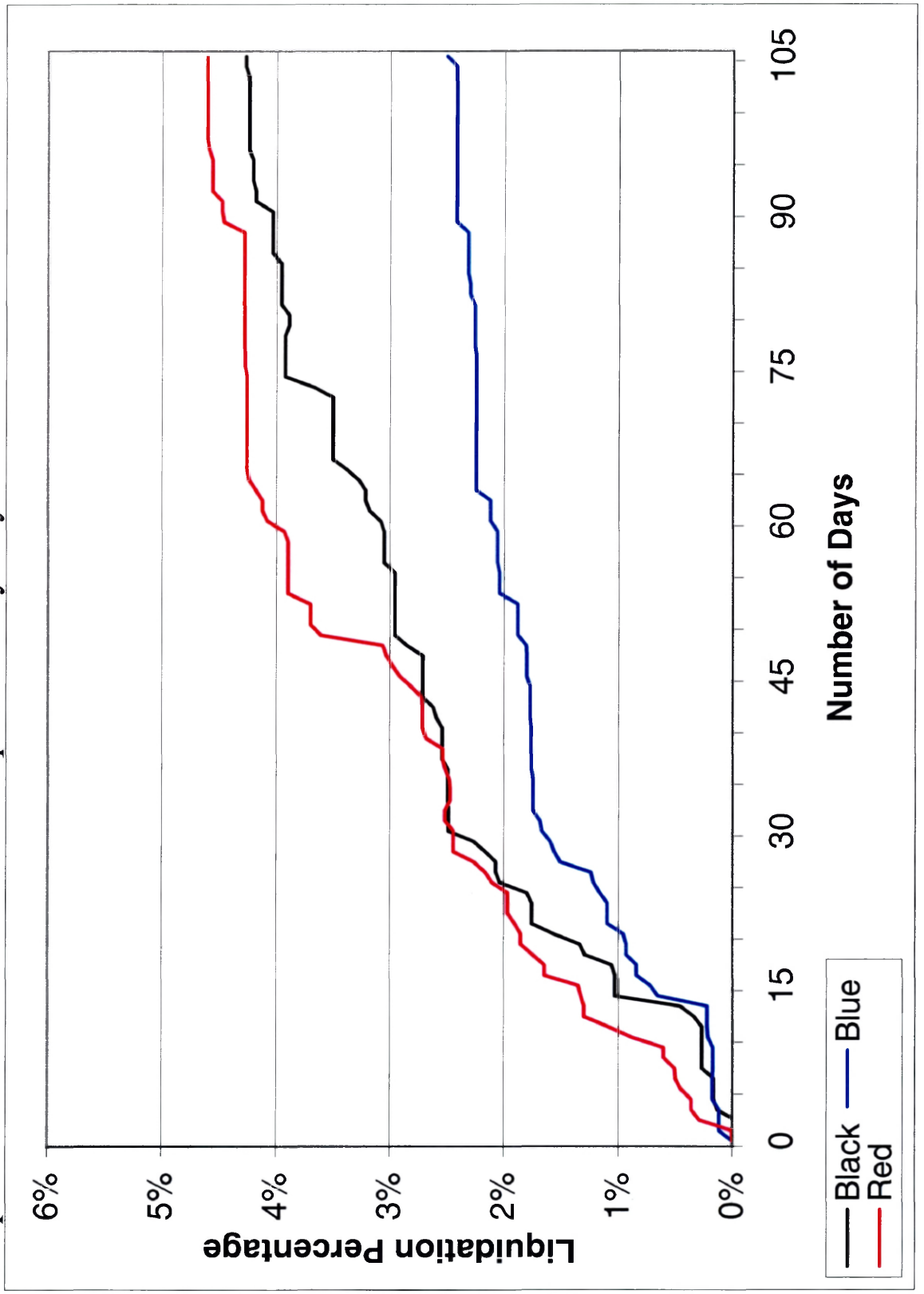
Graph 9: State 9 Font Color Liquidation by Day



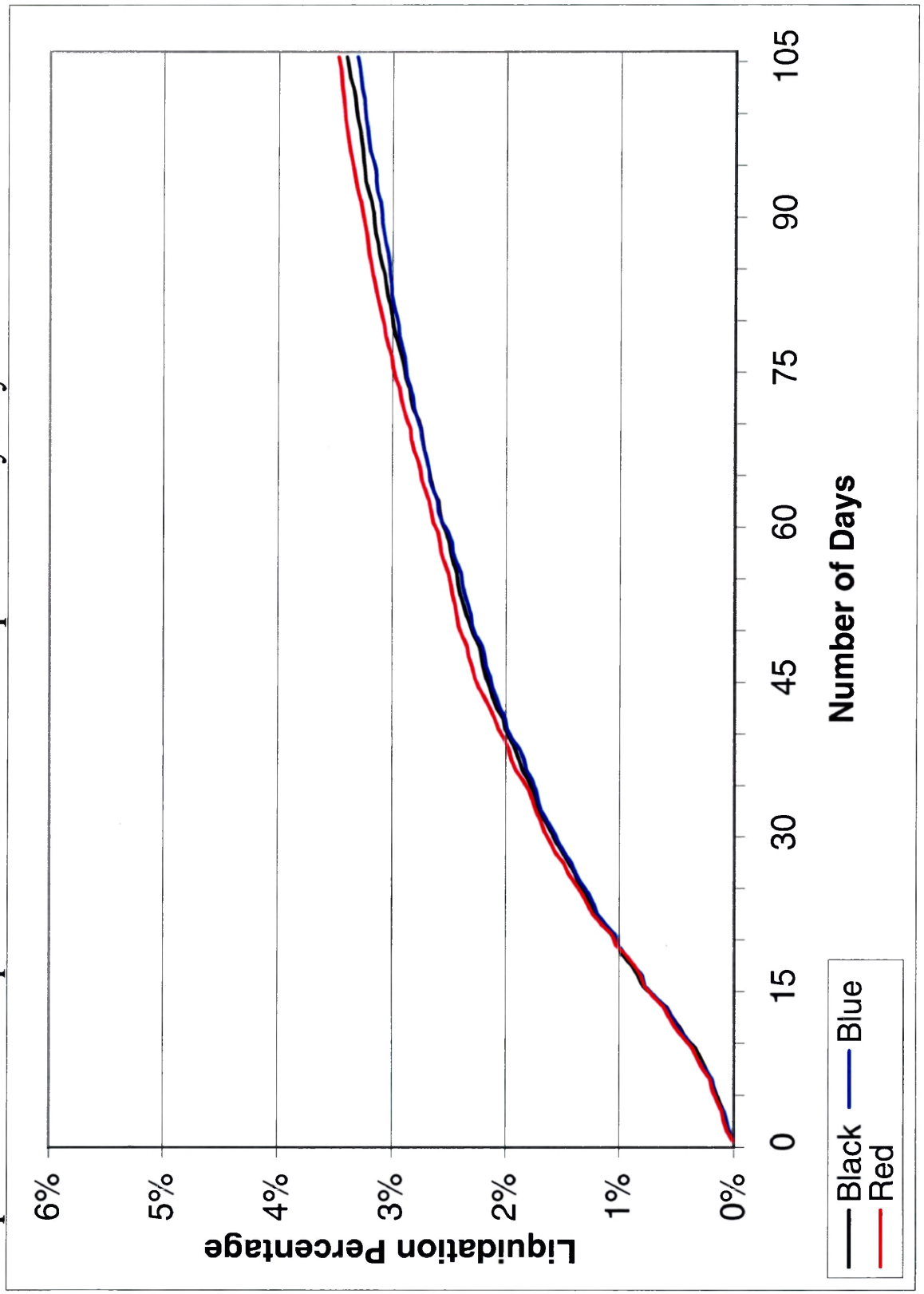
Graph 10: State 10 Font Color Liquidation by Day



Graph 11: State 11 Font Color Liquidation by Day



Graph 12: Total Population Font Color Liquidation by Day



APPENDIX 5

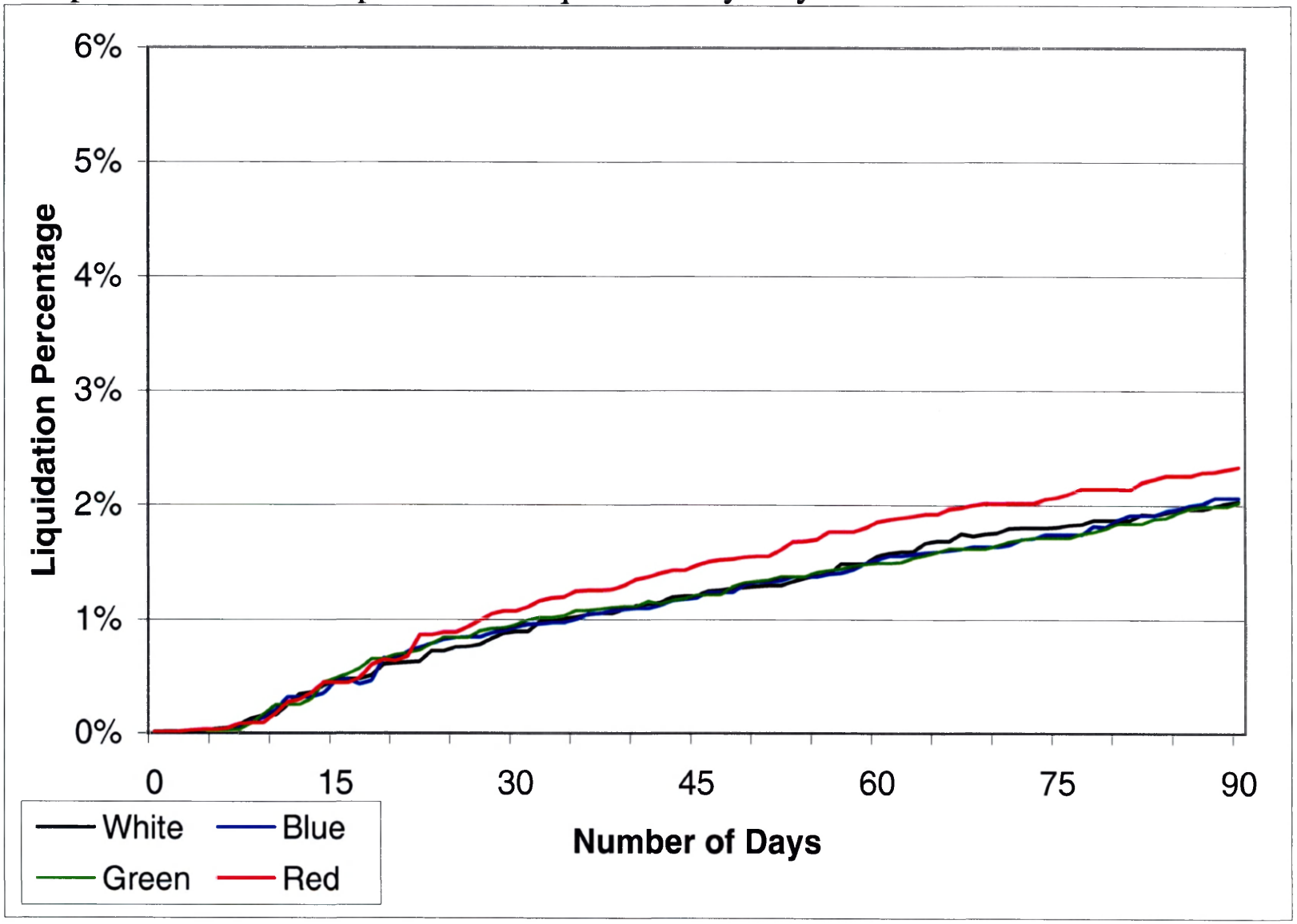
Table 9: Paper Color Study Liquidation and Significance Levels

	Liquidation Percentage Day 15	Liquidation Percentage Day 30	Liquidation Percentage Day 45	Liquidation Percentage Day 60	Liquidation Percentage Day 75	Liquidation Percentage Day 90	Z Score
State 12							
White	0.5	0.9	1.2	1.6	1.8	2.0	-0.533
Blue	0.5	0.9	1.2	1.5	1.7	2.1	2.660 *
Green	0.5	0.9	1.2	1.5	1.7	2.0	-0.682
Red	0.4	1.1	1.5	1.9	2.1	2.3	24.178 *
State 13							
White	0.5	1.0	1.4	1.8	2.0	2.2	-17.102 *
Blue	0.6	1.4	1.9	2.3	2.5	2.8	33.446 *
Green	0.5	1.2	1.5	1.9	2.3	2.7	27.826 *
Red	0.4	1.1	1.5	1.9	2.1	2.5	16.684 *
State 14							
White	0.4	1.1	1.4	1.7	1.9	2.2	10.824 *
Blue	0.4	0.9	1.1	1.3	1.5	1.8	-21.263 *
Green	0.3	0.8	1.1	1.6	1.8	2.2	-3.977 *
Red	0.2	0.9	1.5	1.8	2.0	2.3	3.843 *
State 15							
White	0.8	1.4	1.9	2.4	2.6	3.2	19.079 *
Blue	0.4	1.0	1.5	1.7	2.1	2.6	-27.999 *
Green	0.7	1.6	2.1	2.6	2.8	3.3	6.372 *
Red	0.4	0.9	1.6	2.0	2.2	2.6	-27.176 *
State 16							
White	0.7	1.1	1.5	1.8	2.1	2.6	-1.259
Blue	0.6	1.1	1.5	2.0	2.2	2.6	1.562
Green	0.7	1.4	2.0	2.4	2.7	3.0	22.490 *
Red	0.6	1.1	1.5	1.8	2.1	2.5	-0.825
State 17							
White	1.0	1.6	2.1	2.3	2.7	3.1	-2.433 **
Blue	0.8	1.5	1.9	2.2	2.6	3.1	1.874
Green	0.8	1.6	2.2	2.6	2.7	3.1	1.752
Red	0.6	1.4	2.0	2.7	2.9	3.6	19.807 *
State 18							
White	0.7	1.4	2.0	2.4	2.6	3.1	-0.918
Blue	0.8	1.6	2.0	2.9	3.2	3.5	9.730 *
Green	0.9	1.7	2.3	2.7	3.0	3.3	5.425 *
Red	0.6	1.3	1.8	2.1	2.5	3.0	-0.965
State 19							
White	0.8	1.4	1.7	2.6	3.0	3.3	2.065 **
Blue	0.6	1.5	2.1	2.4	2.6	3.1	-4.099 *
Green	0.8	1.7	2.5	2.7	2.8	3.2	-2.126 **
Red	0.7	1.2	1.9	2.6	3.0	3.7	6.847 *
State 20							
White	0.9	1.7	2.1	2.6	3.1	3.4	-4.708 *
Blue	1.1	2.5	3.1	4.0	4.3	4.8	17.483 *
Green	1.5	2.4	2.9	3.2	4.0	4.4	12.766 *
Red	0.3	0.7	1.6	2.0	2.7	2.9	-7.230 *
State 21							
White	0.3	0.4	0.5	0.5	0.5	0.5	-19.418 *
Blue	0.9	1.3	1.1	1.4	1.7	1.9	23.206 *
Green	0.4	0.5	1.0	1.0	1.2	1.5	18.058 *
Red	0.4	0.7	1.7	1.7	1.8	2.4	29.336 *
Total Population							
White	0.6	1.1	1.5	1.9	2.1	2.4	-7.677 **
Blue	0.5	1.1	1.5	1.9	2.1	2.5	3.150 *
Green	0.6	1.2	1.6	2.0	2.3	2.6	29.186 **
Red	0.4	1.1	1.6	2.0	2.1	2.5	15.093 *

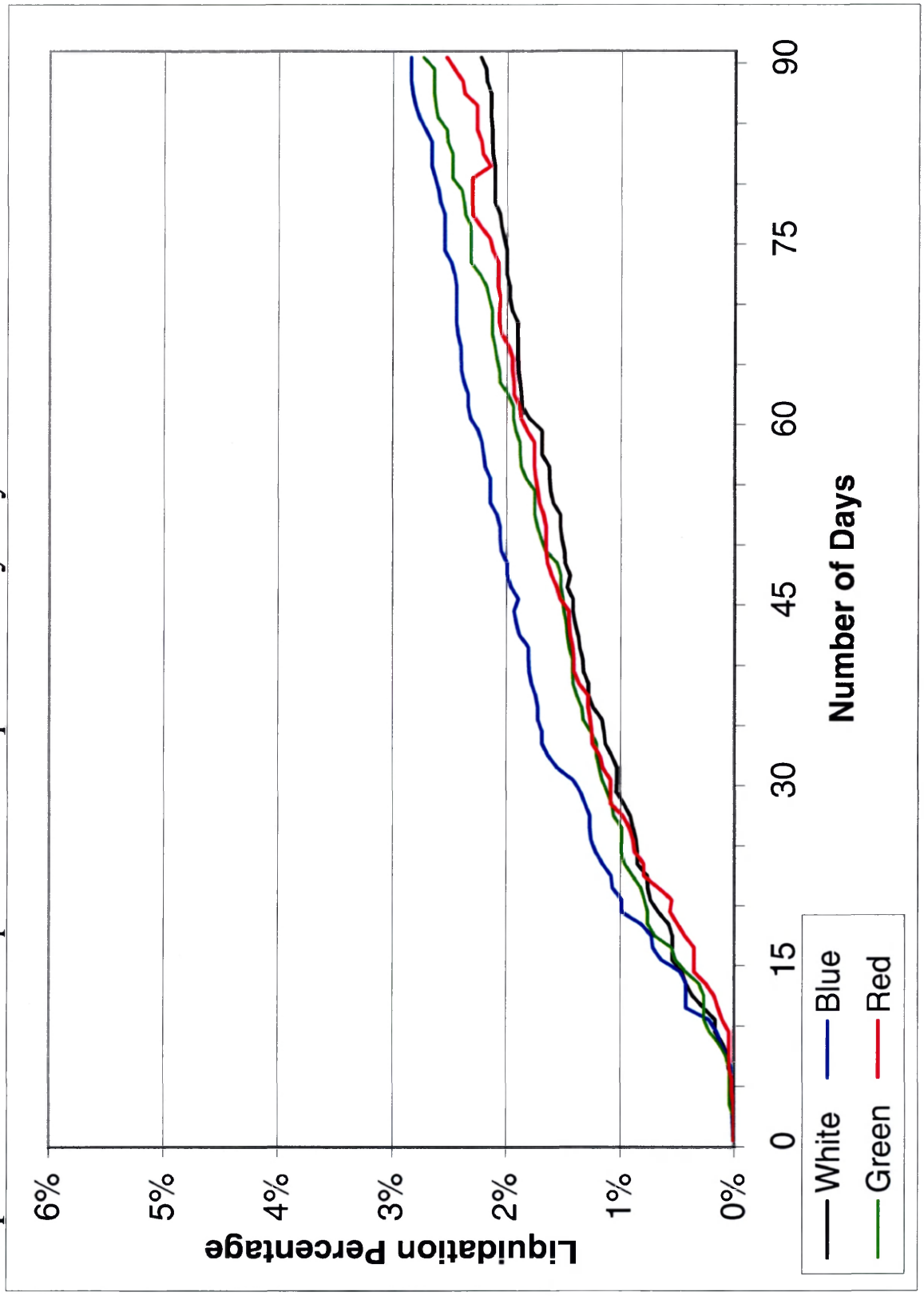
* A 99% level of signifigance.
** A 95% level of signifigance.

APPENDIX 6

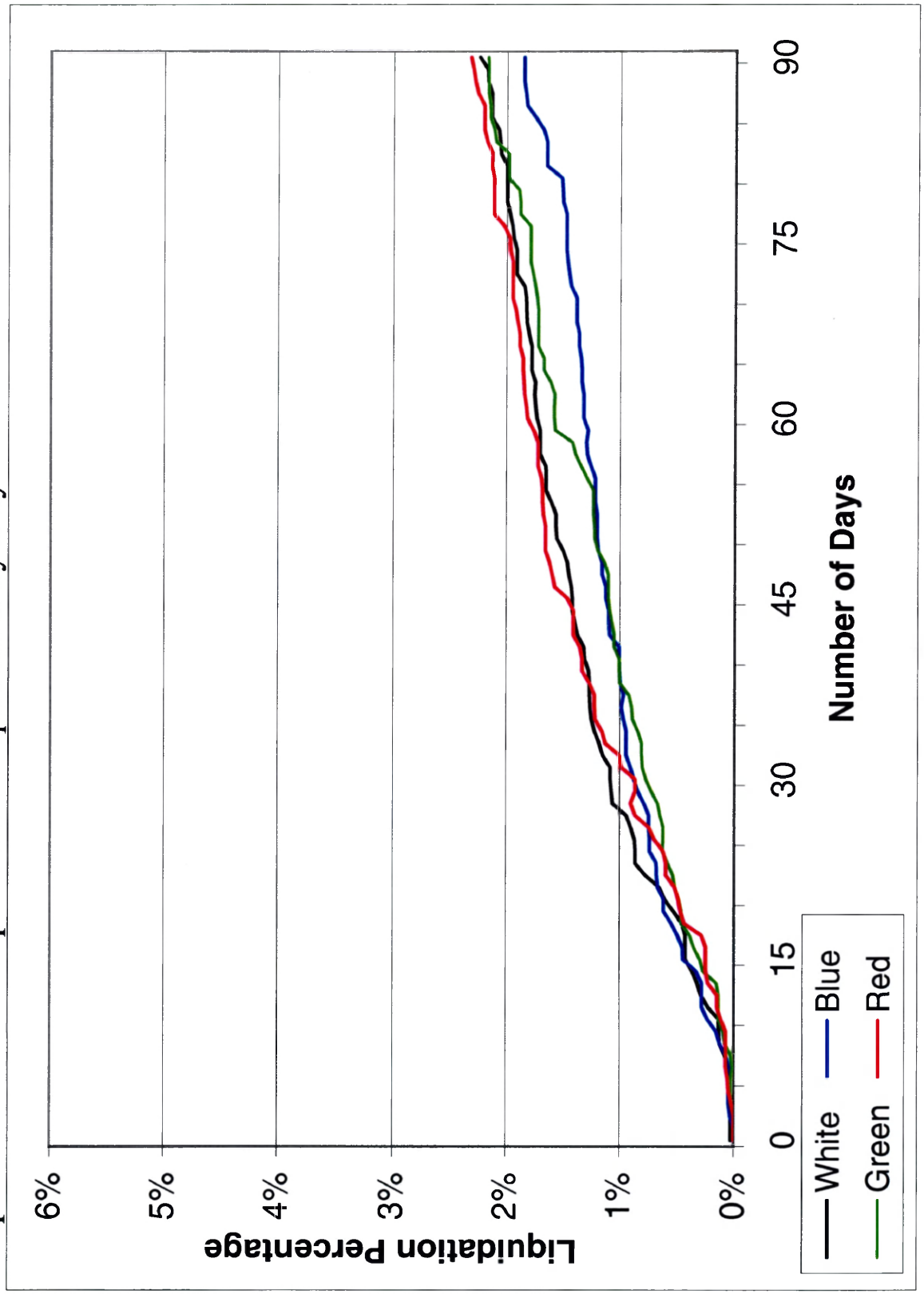
Graph 13: State 12 Paper Shade Liquidation by Day



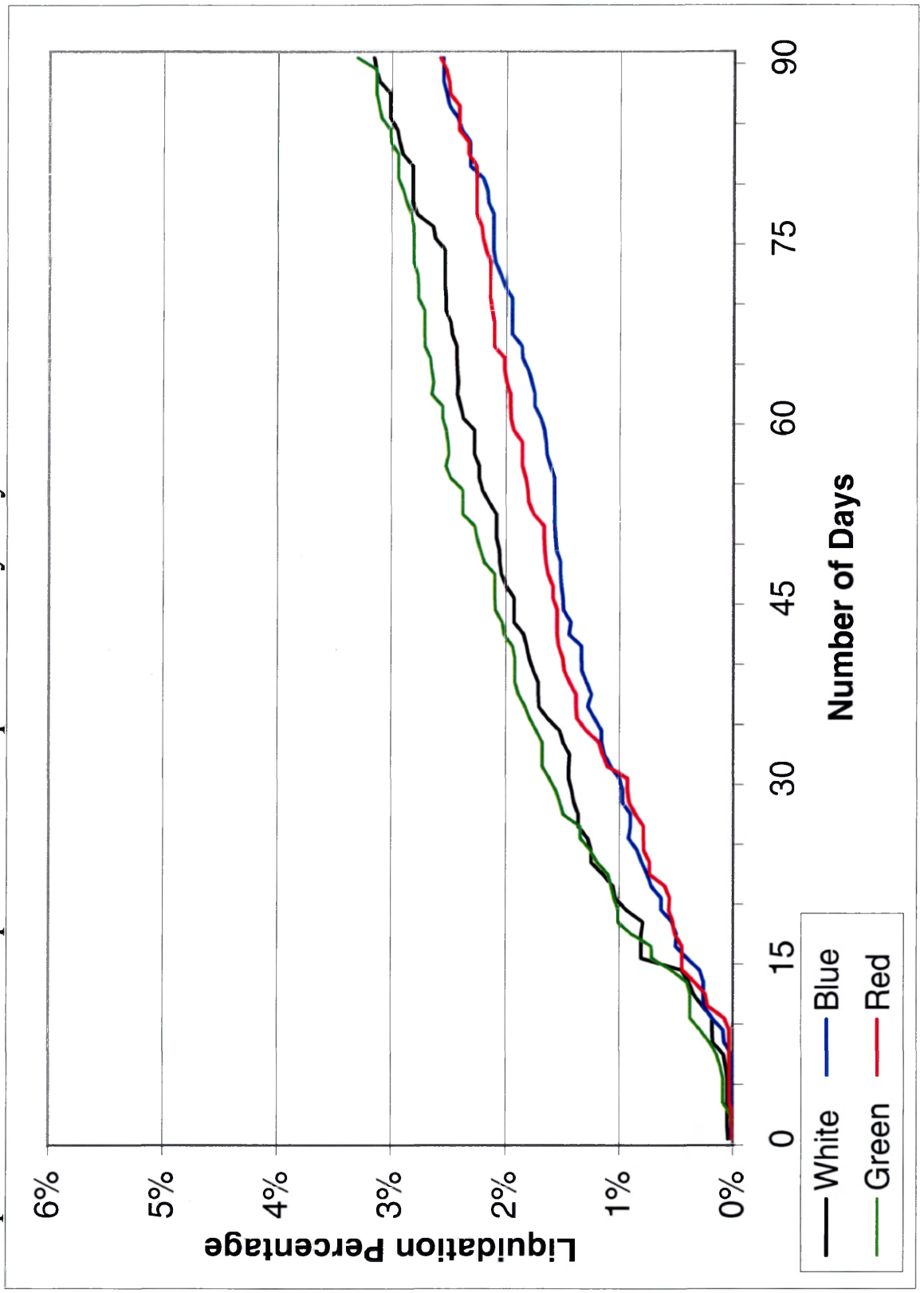
Graph 14: State 13 Paper Shade Liquidation by Day



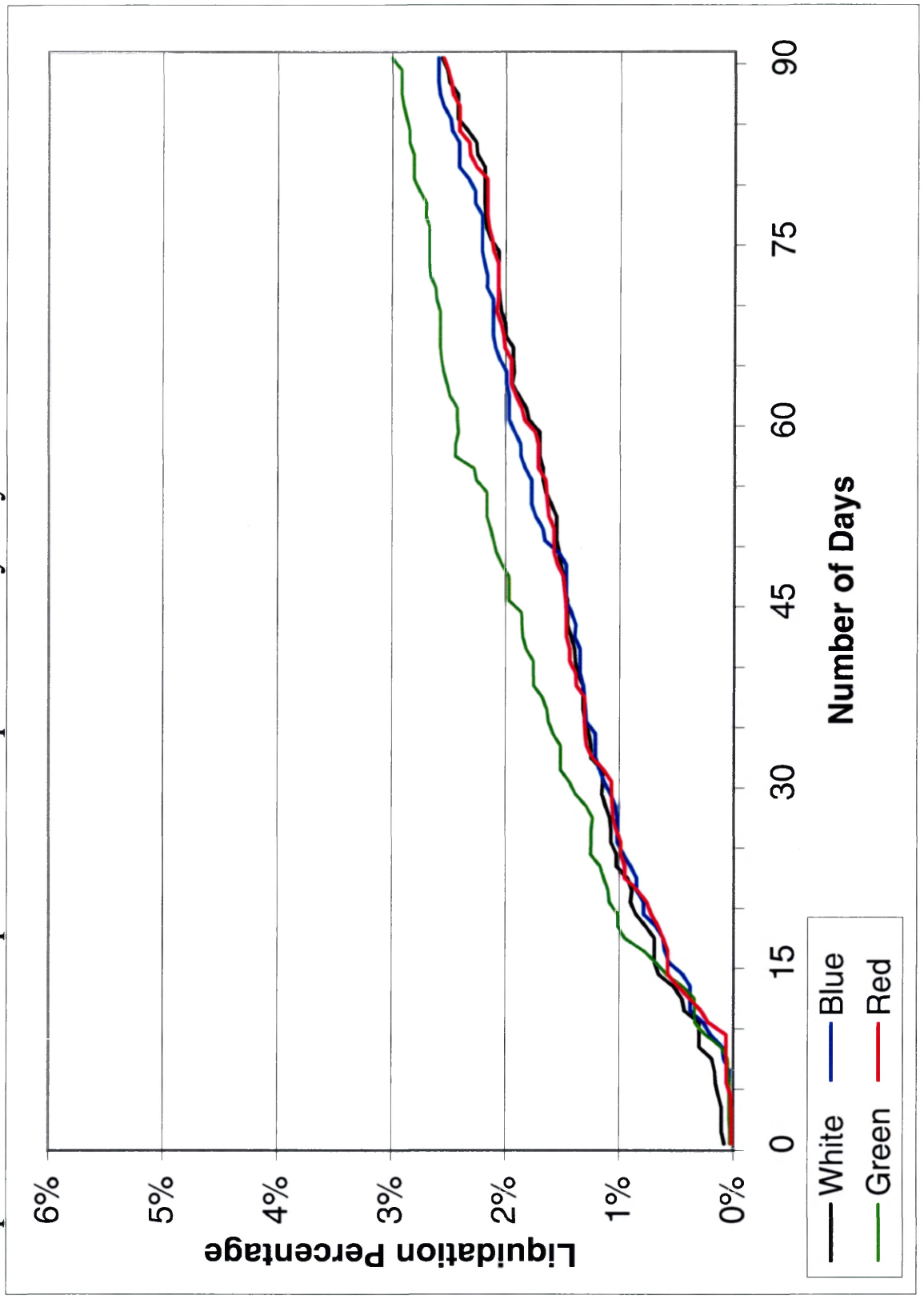
Graph 15: State 14 Paper Shade Liquidation by Day



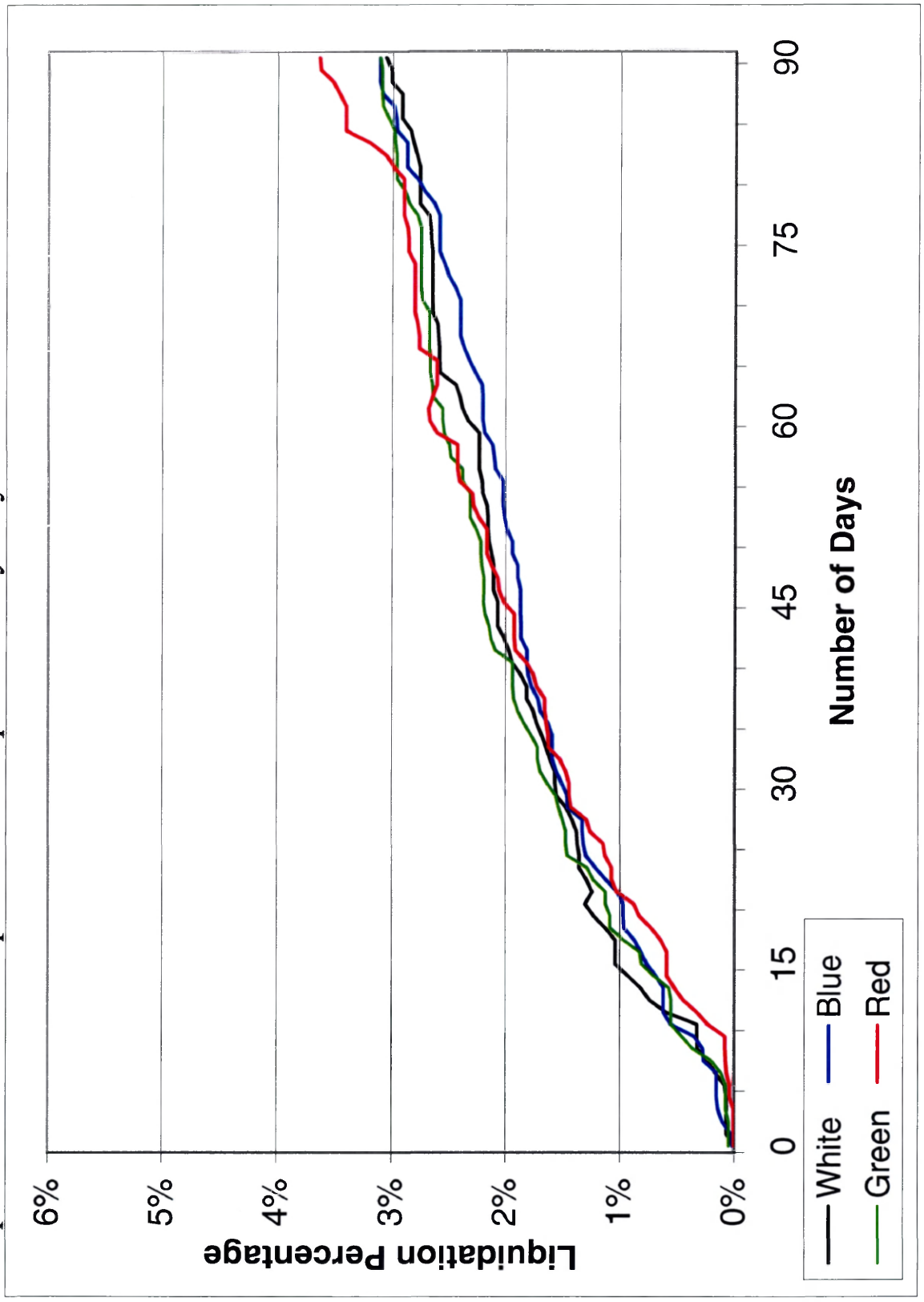
Graph 16: State 15 Paper Shade Liquidation by Day



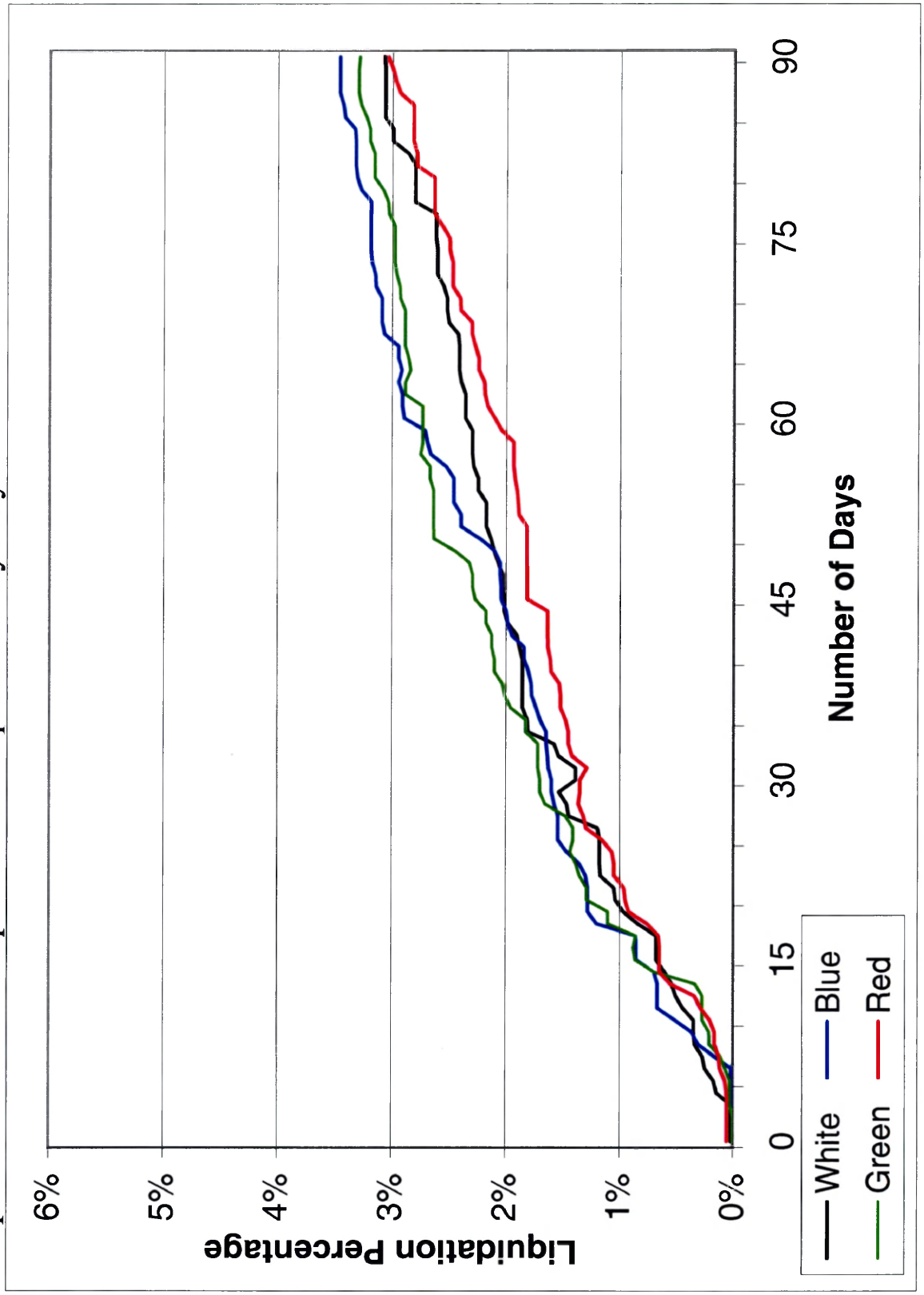
Graph 17: State 16 Paper Shade Liquidation by Day



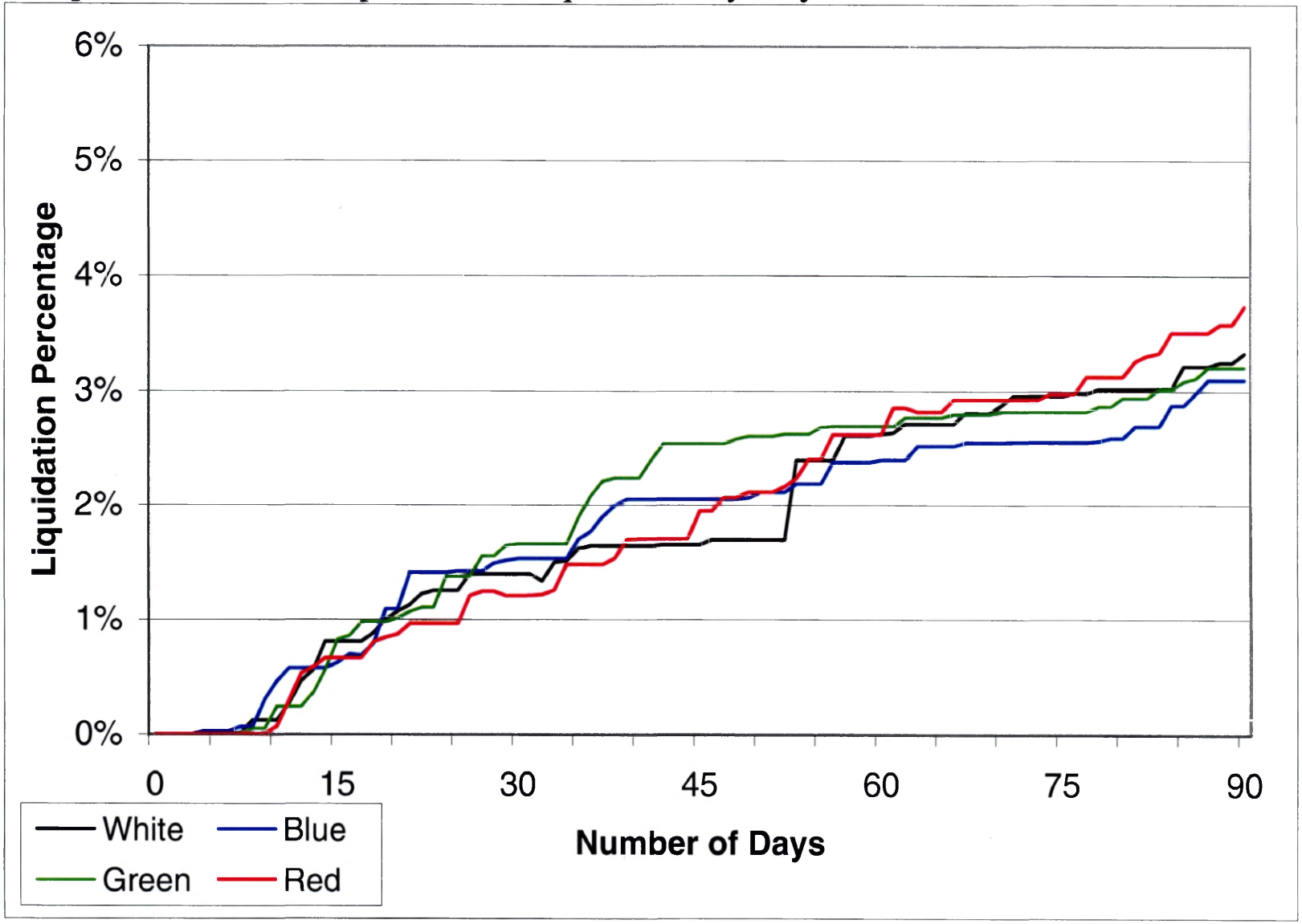
Graph 18: State 17 Paper Shade Liquidation by Day



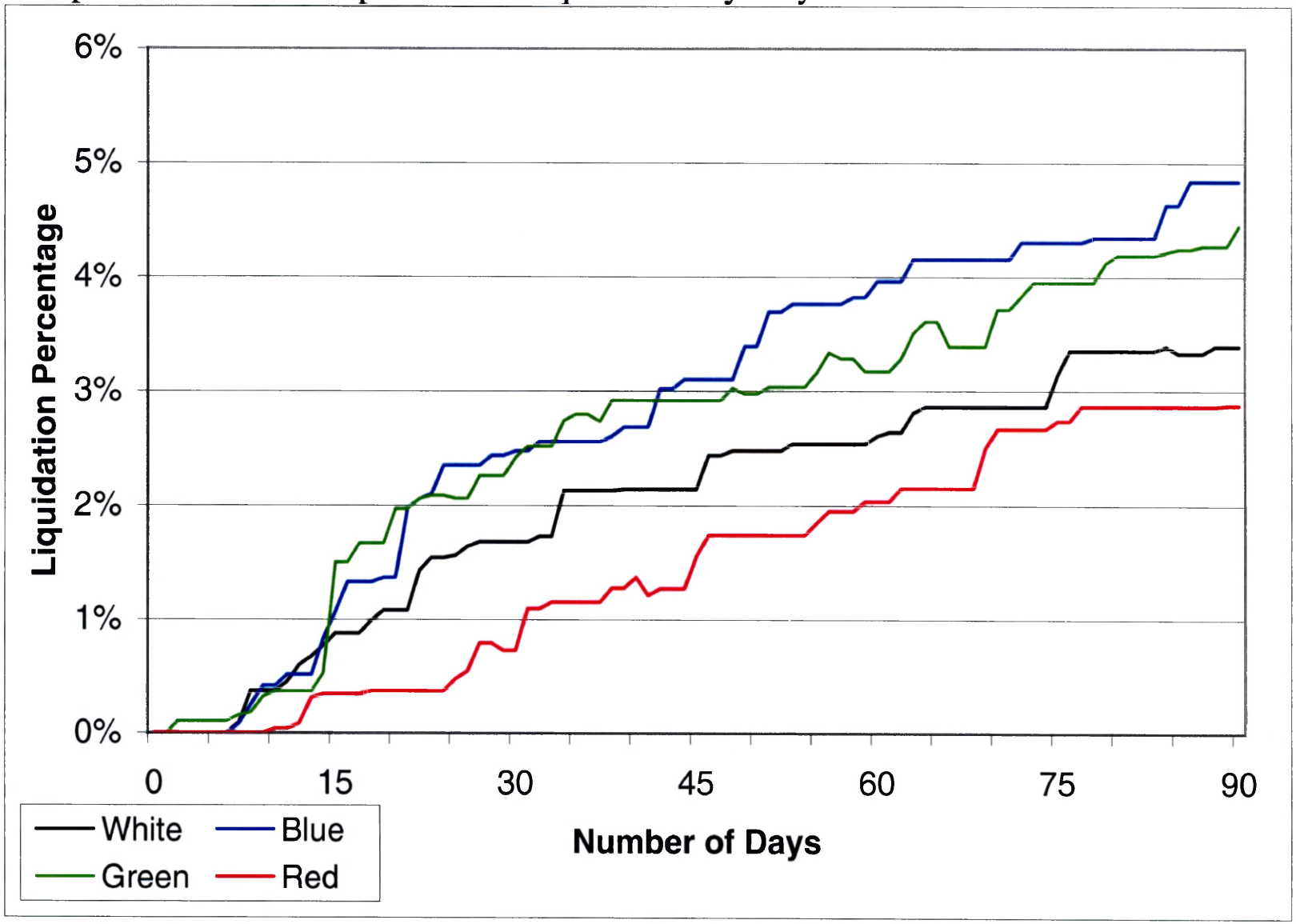
Graph 19: State 18 Paper Shade Liquidation by Day



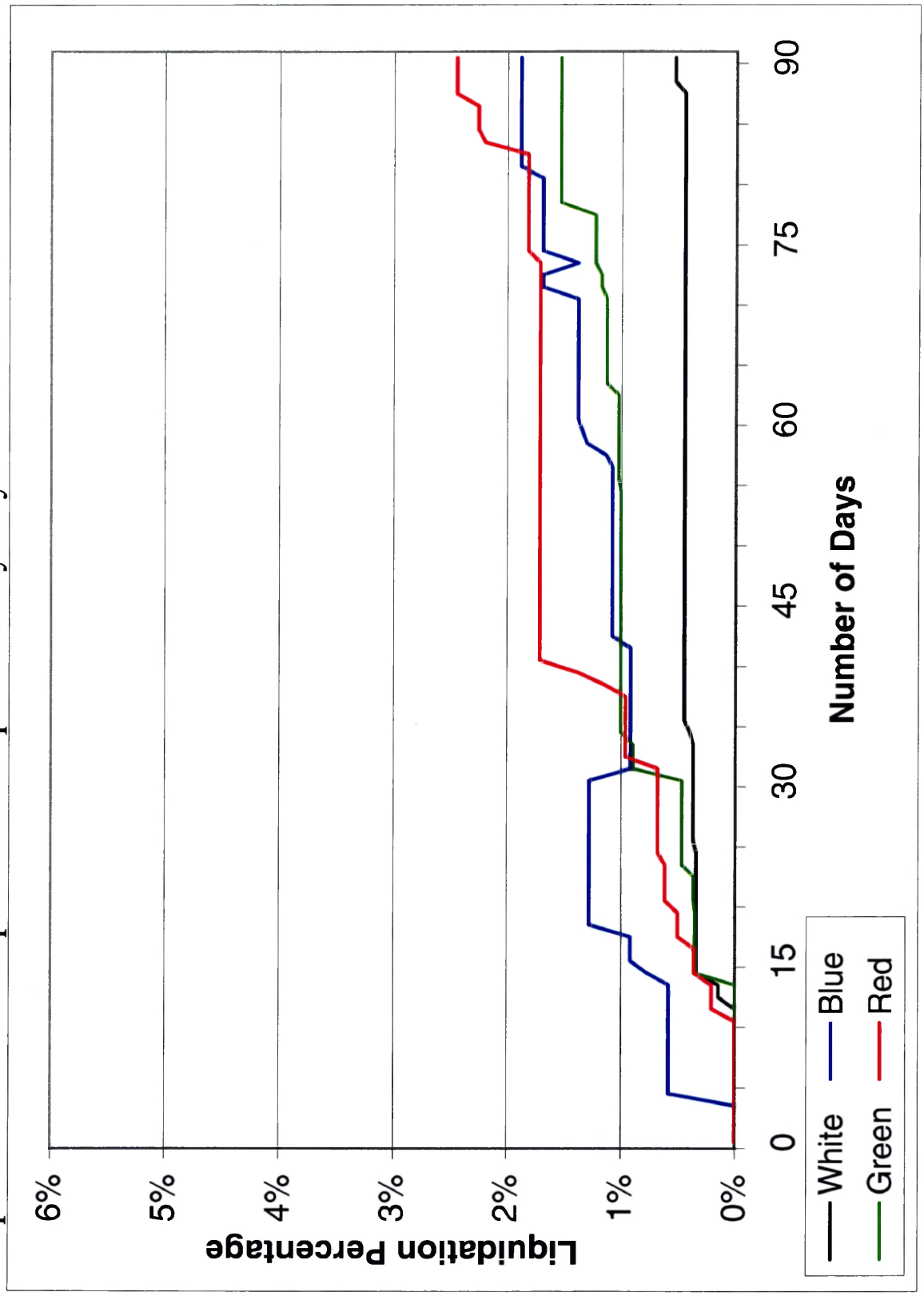
Graph 20: State 19 Paper Shade Liquidation by Day



Graph 21: State 20 Paper Shade Liquidation by Day



Graph 22: State 21 Paper Shade Liquidation by Day



Graph 23: Total Population Paper Shade Liquidation by Day