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AUTHOR Thompson, Bruce; And Others
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ABSTRACT

The Fennema-Sherman Mathematics Attitudes Scales (E. Fennema and J. A. Sherman, 1976) are among the most popular measures used in studies of attitudes toward mathematics. However, the measurement integrity of the scores has not yet been established conclusively. Measurement integrity was explored by using data from 174 elementary school teachers of mathematics in an urban public school system. Both the factor structure and sensitivity to social desirability response set were investigated. Results of factor structure analysis were generally favorable with regard to the validity of scores. Although there was not a perfect fit with the model posited by the measure's authors, reasonable general correspondence was attained. Divergent construct validity coefficients were also favorable. Two tables and one figure present study findings. Appendix A presents item stems and scale classifications, and Appendix B contains the varimax rotated structure/pattern coefficients from the principal components analysis. (Author/SLD)

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Measurement Integrity of Scores from the Fennema-Sherman Mathematics Attitudes Scales: The Attitudes of Public School Teachers

Bruce Thompson

Texas A&M University 77843-4225
and
Baylor College of Medicine

Janet G. Melancon

Loyola University

Shirley Becnel

Jefferson Parish (LA) Public Schools

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ABSTRACT

The Fennema-Sherman Mathematics Attitude Scales (Fennema & Sherman, 1976) are among the most popular measures used in studies of attitudes towards mathematics. However, the measurement integrity of the scores produced by the measure has not yet been conclusively established. The present study explored this measurement integrity issue by employing data provided by public elementary school teachers of mathematics. Both the measure's factor structure and the measure's sensitivity to social desirability response set were investigated.

For at least 15 years there has been considerable interest in attitudes toward the study of mathematics and in the correlates of these attitudes (Sherman & Fennema, 1977). There have been longstanding controversies regarding whether gender differences in mathematics achievement are environmentally or genetically based (Fennema, 1981). There has been controversy over the origins of the limited participation of women in mathematics-related occupations (e.g., Fennema, Wolleat, Pedro & Becker, 1981). And there has been controversy over whether or not males and females are treated differently by teachers during mathematics instruction (e.g., Becker, 1981). Some researchers have posited that these phenomena may partially originate from the societal attitudes and the transmission of these attitudes to young students.

The Fennema-Sherman Mathematics Attitude Scales (Fennema & Sherman, 1976) are among the most popular measures used in these studies. However, the measurement integrity of the scores produced by the measure has not yet been conclusively established (O'Neal, Ernest, McLean & Templeton, 1988). The present study explored this measurement integrity issue by employing data provided by public elementary school teachers of mathematics.

Factor analysis was the major analytic tool used to evaluate score validity. Factor analysis is seminal to the evaluation of the validity of data in hand, as well as to construct elaboration. As Nunnally (1978) noted,

> construct validity has been spoken of as "trait validity" and "factorial validity".... Factor

> analysis is intimately involved with questions of validity... Factor analysis is at the heart of the measurement of psychological constructs. (pp. 111-112)

Gorsuch (1983) concurs with this view, noting that "A prime use of factor analysis has been in the development of both the theoretical constructs for an area and the operational representatives for the theoretical constructs" (pp. 350-351). Similarly, Hendrick and Hendrick (1986) noted that "theory building and construct measurement are joint bootstrap operations" (p. 393). Factor analysis at once **both** tests measurement integrity and sheds light on underlying theory.

The purpose of the present paper was to explore the measurement integrity of scores on the Fennema-Sherman Scales. Specifically, the study addressed two research questions. First, what structure underlies responses to the measure, i.e., does the structure correspond to that posited by the authors via their identification of scales? Second, are scores on the Fennema-Sherman scales appreciably correlated with scores on a measure of preferences to give socially desirable responses on attitude measures? The second question involved the construct validity of scores from the Scales. If the scores on the Scales have good divergent validity, they should not measure sensitivity to social desirability response set.

Method

Subjects

The subjects in the study were 174 elementary school teachers. The subjects taught in one of 12 elementary schools located within an urban public school system. The sample predominantly consisted of women (97.1%).

Instrumentation

All subjects completed the items on the Fennema-Sherman Scales using a "1" to "5" Likert-scale response format. As part of this instrument the subjects completed 12 items about their mothers' attitudes toward math that were created by changing the use of the word, "father", to "mother" in this duplicate item set. The subjects also completed a short-form version of the Marlowe-Crowne measure of susceptibility to social desirability response set (Zook & Sipps, 1985).

Results

1. Factor Analytic Results

Analysts differ quite heatedly over the utility of principal components as against common or principal factor analysis. For example, an entire special issue on this controversy was recently published in Multivariate Behavioral Research. The difference between the two approaches involves the entries used on the diagonal of the correlation matrix that is analyzed--principal components analysis uses ones on the diagonal while common factor analysis uses estimates of reliability, usually estimated through an iterative process.

The two methods yield increasingly more equivalent results as either (a) the factored variables are more reliable or (b) the

number of variables being factored is increased. Snook and Gorsuch (1989, p. 149) explain this second point, noting that "As the number of variables decreases, the ratio of diagonal to off-diagonal elements also decreases, and therefore the value of the commonality has an increasing effect on the analysis." For example, with 10 variables the 10 diagonal entries in the correlation matrix represent 10% (10 / 100) of the 100 entries in the matrix, but with 100 variables the diagonal entries represent only 1% (100 / 10,000) of the 10,000 matrix entries. Gorsuch (1983) suggests that with 30 or more variables the differences between solutions from the two methods are likely to be small and lead to similar interpretations.

Figure 1 presents the "scree" plot of the eigenvalues of the correlation matrix, which are associated with the extracted factors prior to (and not after) rotation (Thompson, 1989). Based on an examination of the eigenvalues, eight factors were extracted and rotated to the varimax criterion. The most salient items, with the largest factor structure coefficients, are presented in Table 2.

INSERT FIGURE 1 AND TABLE 1 ABOUT HERE

2. Divergent Construct Validity Coefficients

Table 2 presents the divergent validity coefficients involving product-moment correlation coefficients between conventional least-squares factor scores (Thompson, 1983) and scores on the measure of susceptibility to social desirability response set. The factor scores were perfectly uncorrelated with each other, since principal

components were rotated to the varimax criterion, so only the eight potentially non-zero off-diagonal values are reported in the table.

INSERT FIGURE 1 AND TABLE 1 ABOUT HERE

Discussion

The results of the factor structure analysis, reported in Table 1, were generally favorable as regards the validity of scores from the Fennema-Sherman Scales (FSS). Factor I in the present study measured "Math-Related Affect"; the factor involved various items from the Fennema-Sherman Scales, and especially items from the Confidence, Anxiety, and Effectance Motivation scales. Factor II measured "Parents' Attitudes", and included items from the Father scale and the parallel "mother" items.

Factor III measured the "Attitudes toward Success" scale from the FSS. Factor IV measured the "Teachers" scale from the FSS. Factor V measured the "Usefulness" scale from the FSS. Factor VI measured the "Male Dominance" scale from the FSS. Factors VII and VIII were not readily interpretable, but were useful in isolating the position of the factors in factor space during rotation. The results suggest that the items that were most highly correlated with these two factors may measure other constructs, and might be considered for omission in future research.

The factor isolated in the present study were not perfect fits with the model posited by the measure's authors. However, the general correspondence was reasonable, and is especially noteworthy given the relatively small size of the sample in relation to the

number of variables considered in the analyses.

The divergent construct validity coefficients reported in Table 2 were also favorable. Most of the coefficients were near zero. The largest of the coefficients involved factor scores on "Utility" and scores on the social desirability measure; even this effect size ($r^2 = .2855^2 = 8.2\%$) was relatively small. Thus, on the whole, the results in the present study were reasonably supportive of a conclusion that scores on the measure are reasonably valid.

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Table 1
Selected Items and Structure Coefficients

r_s	Item	Item Core
		Factor I
.83	V086 c+	I have lot self-confidence when it comes to math
-.82	V080 a-	Mathematics makes me feel uneasy and confused
-.82	V053 c-	Even though I study, math seems unusually hard for me
.80	V050 a+	I usually have been at ease in math classes
-.78	V001 e-	Figuring out mathematical problems does not appeal to me
		Factor II
.79	V108 f+	My father thinks I could be good in math
-.78	V095 f-	Long as I passed father not care how I done in math
-.75	V013 f-	My father thinks I need to know a minimum amount of math
.74	V121 f-	My father always been interested in my progress in math
.73	V094 m+	My mother has strongly encouraged me do well in math
		Factor III
.69	V032 as+	I would be happy to get top grades in mathematics
.66	V114 as+	It would be great to win a prize in math
.65	V085 as+	Make me happy to be recognized as excellent math student
.63	V120 as+	I'd be proud to be the outstanding student in math
.57	V084 md+	Girls can do just as well as boys in math
		Factor IV
.65	V081 t-	I have hard time getting teachers talk seriously with me math
.58	V052 t-	I find it hard to win the respect of math teachers
.51	V073 t-	When serious, I feel ignored when talking to math teachers
.46	V024 t-	Getting a math teacher to take me serious has been a problem
-.45	V008 t+	Math teachers have been interested in my progress in math
		Factor V
.59	V057 u-	Mathematics is of no relevance to my life
.58	V068 u-	I see math as a subject I will rarely use in my daily life
.57	V061 u-	I expect to use little math after I get out of school
-.47	V102 u+	I need math for my future work
		Factor VI
.56	V099 md-	Math is for men; arithmetic is for women
.55	V029 md-	I would expect a woman mathematician to be the masculine type
.49	V021 md-	I have more faith in a math problem answered by a man
		Factor VII
.73	V009 md+	Studying math is just as appropriate for women as for men
.69	V006 u+	Mathematics is a worthwhile and necessary subject
-.47	V056 as-	I would be liked less if I were a really good math student
.45	V010 as+	Being regarded as smart in math would be a great thing
		Factor VIII
.34	V107 u-	In terms my adult life not important me do well in math
.31	V017 md+	Male are not naturally better than females in mathematics

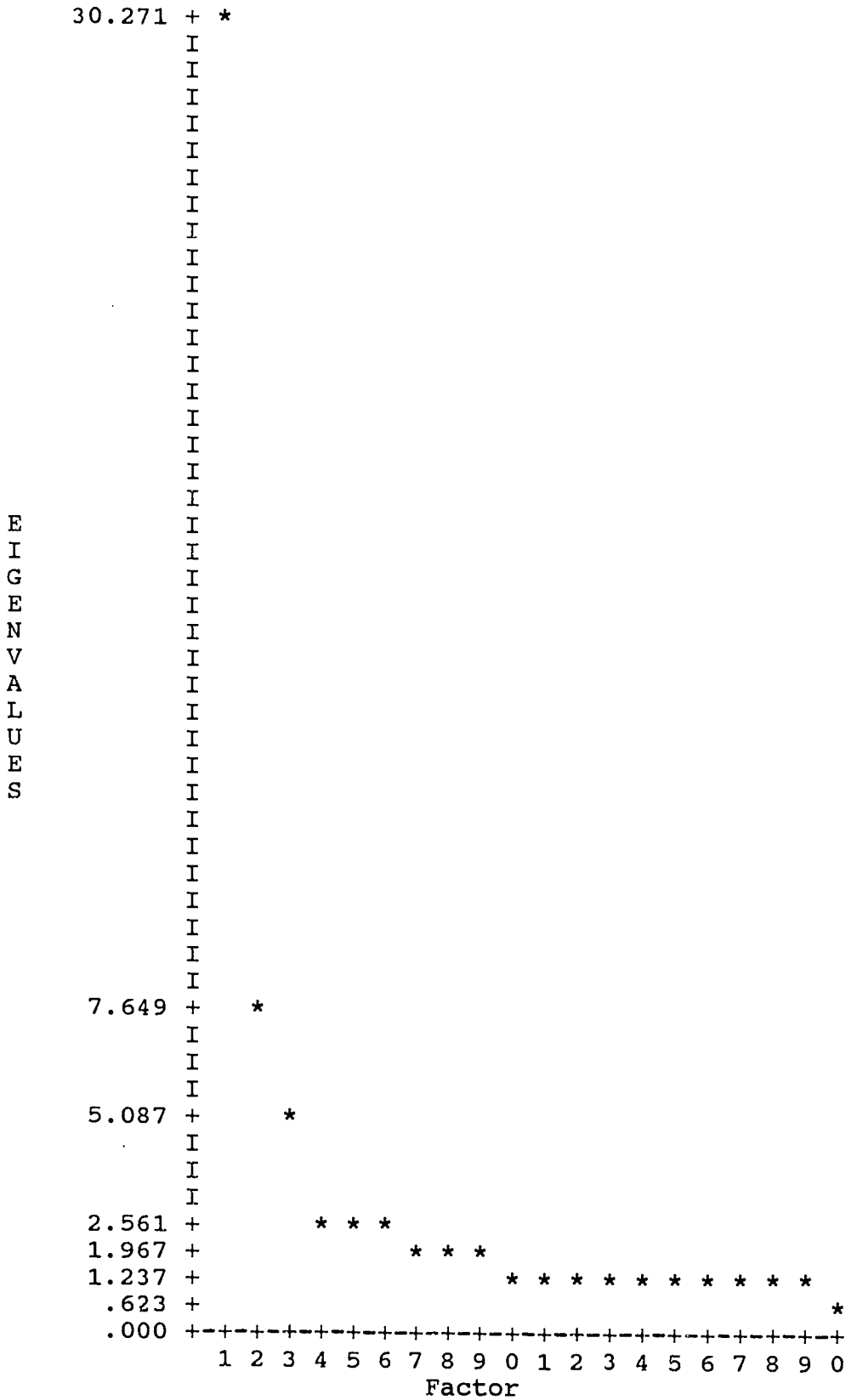
Table 2
Correlation Coefficients
Between Factor Scores
and Scores on the Social Desirability Scale

	Social Desirability
Factor I	-.1285
Factor II	-.2160**
Factor III	-.0127
Factor IV	.0923
Factor V	.2855**
Factor VI	.1778*
Factor VII	.0364
Factor VIII	-.0254

* $p < .05$ ** $p < .01$

Note. The factor scores were perfectly uncorrelated with each other, since principal components were rotated to the varimax criterion.

Figure 1
"Scree" Plot of r Matrix Eigenvalues
Associated with Factors Before Rotation (Thompson, 1989)



Appendix A
Item Stems and Scale Classifications

No.	Scale	Item Core Content
V001	e-	Figuring out mathematical problems does not appeal to me
V002	a+	Math does not scare me at all
V003	f-	My father thinks advanced math is a waste of time for me
V004	md-	Girls who enjoy studying math are a bit peculiar
V005	a-	I can not think clearly when working mathematics
V006	u+	Mathematics is a worthwhile and necessary subject
V007	c+	Generally I have felt secure about attempting mathematics
V008	t+	Math teachers have been interested in my progress in math
V009	md+	Studying math is just as appropriate for women as for men
V010	as+	Being regarded as smart in math would be a great thing
V011	a-	Math usually makes me feel uncomfortable and nervous
V012	m+	My mother thinks I am the kind of person to do well in math
V013	f-	My father thinks I need to know a minimum amount of math
V014	u+	I'll need a firm mastery of mathematics for my future of work
V015	e+	I am challenged by math I can not understand immediately
V016	c-	Math has been my worst subject
V017	md+	Male are not naturally better than females in mathematics
V018	m-	My mother thinks advanced math is a waste of time for me
V019	sd-	I am sometimes irritated by people who ask favors of me
V020	sd-	It is sometimes hard to do my work if I am not encouraged
V021	md-	I have more faith in a math problem answered by a man
V022	f+	My father thinks I am the kind of person to do well in math
V023	md+	I trust a woman as much as a man in figuring calculations
V024	t-	Getting a math teacher to take me serious has been a problem
V025	a-	A math test would scare me
V026	m-	As long as I pass, my mother does not care how I do in math
V027	e-	I do as little work in math as possible
V028	m-	My mother would not encourage a career for me involving math
V029	md-	I would expect a woman mathematician to be the masculine type
V030	md+	Women are certainly logical enough to do well in mathematics
V031	sd+	I am always willing to admit when I make a mistake
V032	as+	I would be happy to get top grades in mathematics
V033	e+	Once I start working on math puzzles, I find it hard to stop
V034	t+	My teachers have encouraged me to study more mathematics
V035	sd-	I sometimes feel resentful when I do not get my way
V036	f-	My father would not encourage a career for me involving math
V037	e-	Math puzzles are boring
V038	f-	My father shows no interest whether I take more math classes
V039	f+	My father thinks I need math for what I do after I graduate
V040	e+	Mathematics is enjoyable and stimulating to me.
V041	sd+	I am always courteous, even to those who are disagreeable
V042	u-	Math will not be important to me in my life and work
V043	t+	My teachers would encourage me to take all the math I can
V044	m+	My mother thinks I need math for what I do upon graduating
V045	c-	I do not think I could complete advanced mathematics
V046	m+	My mother thinks math is the most important subject I study
V047	a+	I have not worried about not be able to solve math problems
V048	c-	I am no good in math
V049	m+	My mother has always been interested in my math progress
V050	a+	I usually have been at ease in math classes
V051	f+	My father thinks math is the most important subject I study
V052	t-	I find it hard to win the respect of math teachers
V053	c-	Even though I study, math seems unusually hard for me
V054	e-	I want be given the solution to a problem instead of trying
V055	t+	My teachers think I am the type who could do well in math
V056	as-	I would be liked less if I were a really good math student
V057	u-	Mathematics is of no relevance to my life

V058 md+ Females are as good as males in geometry
V059 as- If I had good grades in math, I would try to hide it
V060 as- People would think of me as a grind if I got A's in math
V061 u- I expect to use little math after I get out of school
V062 e+ When I cannot solve a math problem, I try until it is solved
V063 c+ I am sure I could do advanced work in mathematics
V064 sd- I sometimes try to get even rather than forgive and forget
V065 t+ I would talk to my teachers about a career which uses math
V066 sd+ I have never deliberately said something to hurt someone
V067 md- It is hard to believe that a female could be a genius in math
V068 u- I see math as a subject I will rarely use in my daily life
V069 f+ My father has strongly encouraged me to do well in math
V070 m- My mother thinks I need to know a minimum amount of math
V071 u+ I will use mathematics in many ways as an adult
V072 c- I am not the type to do well in math
V073 t- When serious, I feel ignored when talking to math teachers
V074 t- My teachers think advanced math is a waste of time for me
V075 c+ I can get good grades in mathematics
V076 m+ My mother thinks I could be good in math
V077 md- It is feminine to ask a man for help
V078 e- Not understand how some so much time on math and enjoy it
V079 as+ Being first in math competition would make me pleased
V080 a- Mathematics makes me feel uneasy and confused
V081 t- I have hard time getting tchrs talk seriously with me math
V082 e+ When question left unanswered in math, I think afterward
V083 sd- Been times I felt like rebelling though I knew they right
V084 md+ Girls can do just as well as boys in math
V085 as+ Make me happy to be recognized as excellent math student
V086 c+ I have lot self-confidence when it comes to math
V087 a- Math makes me unconfortable, restless, irritable, impatient
V088 u+ Knowing math will help me earn a living
V089 as- If I got the highest grade in math, I'd prefer no one knew
V090 e- Challenge of math problems does not appeal to me
V091 sd- Occasions I given up cause thought too little my ability
V092 t- Teachers think I not serious if I interested in math career
V093 sd- There have been occasions when I took advantage of someone
V094 m+ My mother has strongly encouraged me do well in math
V095 f- Long as I passed father not care how I done in math
V096 e+ I like math puzzles
V097 c+ I am sure that I can learn math
V098 u+ I study math cause I know how useful it is
V099 md- Math is for men; arithmetic is for women
V100 as- I don't like people think I smart in math
V101 m- My mother hates to do math
V102 u+ I need math for my future work
V103 c+ Think I could handle more difficult math
V104 u- Taking math is a waste of time
V105 a+ I almost never got shook up during a math test
V106 as- Winning a prize in math me feel unpleasantly conspicuous
V107 u- In terms my adult life not important me do well in math
V108 f+ My father thinks I could be good in math
V109 a+ It not bother me at all to take more math courses
V110 sd- Been times I quite jealous of good fortune of others
V111 sd+ No matter who I'm talking to, I always good listener
V112 a- I get sinking feeling when I trying hard math problems
V113 t+ Math teachers made me feel I have the ability go on in math
V114 as+ It would be great to win a prize in math
V115 m- Mother shown no interest in whether I take more math
V116 sd- I sometimes irritated by people who ask favors of me
V117 sd+ I never been irked people express ideas differ from mine
V118 c- Most subjects I ok, but I have knack for flubbing math
V119 a+ I usually have been at ease during math tests

V120 as+ I'd be proud to be the outstanding student in math
V121 f- My father always been interested in my progress in math

Note. "Scale" is the acronym for the Fennema-Sherman scale and whether or not the item is positively or negatively worded.

Appendix B
Varimax-Rotated Structure/Pattern Coefficients from Principal Components Analysis

	Factor							
Item	I	II	III	IV	V	VI	VII	VIII
V36	.83239	.17028	.10560	-.20331	.09253	-.00913	.01033	-.01555
V80	-.81735	-.07411	-.06682	.05670	.11687	.17852	-.14786	.15607
V53	-.81557	-.10432	-.04055	.14588	.11919	.11970	-.09149	-.05405
V50	.79786	.13946	-.00570	-.10525	-.01954	-.04248	.08317	.06109
V1	-.77625	-.15837	-.08394	-.02200	.08184	-.03119	-.04559	.03182
V11	-.77031	-.02[illegible]1	.08946	.12302	.06559	.07530	-.04829	.01309
V103	.75664	.19379	.19361	-.09509	.03186	.07382	.05349	.13294
V118	-.75152	-.11545	-.15069	.10520	-.04640	.15619	-.08230	-.17720
V90	-.74850	-.14889	-.31858	-.01897	.15677	.03075	.01507	.12557
V72	-.74414	-.12787	-.12002	.04652	.17991	.19434	.04259	-.10316
V7	.73736	.10076	.01488	-.13694	-.01534	.04621	.10119	-.02754
V40	.71801	.20531	.22365	-.01395	-.08772	.08298	-.01215	-.18191
V119	.70584	.14523	-.00589	-.19722	.06260	.08637	.11950	.04609
V112	-.69526	-.10085	-.01984	.14184	.04352	.06313	-.05486	-.11126
V109	.68271	.26114	.15904	.02820	-.21730	.01187	.03588	.00506
V16	-.67625	-.09088	.10425	.05506	.09936	.25238	-.04626	.16999
V87	-.67002	-.17134	-.07488	.01439	.12468	.12803	-.13432	.13771
V2	.66591	.08240	.12214	.00909	.03243	-.16082	.02835	-.16987
V33	.66571	.26143	.26740	.00862	.03118	.05672	-.02248	.08028
V54	-.65775	-.12419	-.18855	.01695	.04241	.02304	.05158	-.11072
V62	.65066	.18093	.12807	.13478	-.16663	.02085	.01649	-.12494
V63	.64884	.30025	.10363	-.06779	-.17007	.07636	-.03162	.19873
V45	-.64532	-.21019	-.03983	.17797	.10376	-.08449	.04197	-.07240
V48	-.61948	-.08985	-.12297	.20335	.13810	.04686	-.10870	-.15512
V96	.61798	.27189	.15079	-.03088	.02290	-.06423	.06436	.22088
V25	-.61545	-.15621	.14219	.20547	.11345	.21864	-.16795	.22269
V105	.61120	.11008	.01236	-.21233	-.10802	.07842	-.03984	.10433
V82	.59212	.13101	.20319	-.01555	-.21338	.11114	-.16896	.19121
V27	-.58484	-.22085	-.14810	.03249	.30936	.03567	.12507	.18605
V15	.56261	.11545	.18722	.24825	-.05936	.00007	.04024	-.06543
V55	.54850	.42720	.12435	-.45331	-.07992	.13872	.06115	.18929
V37	-.53370	-.20287	-.10817	-.14606	.25221	.13249	-.17779	-.09225
V113	.50639	.36097	.10248	-.38816	.02734	.14093	.01715	.19788
V65	.49980	.25293	.12130	-.19169	-.22034	.27135	-.13086	.03173
V75	.49596	.19849	.23340	-.17572	.01698	-.04585	-.03738	.12640
V78	-.49535	-.10660	-.14064	.01437	.26107	.19534	.05311	-.05002
V5	-.49299	.03978	-.17537	.14016	-.00073	.22093	.01216	.27532
V97	.45255	.13919	.31524	-.22513	-.23382	-.07922	.12549	.05724
V34	.43652	.27455	.14066	-.39115	.09157	.32459	.07610	.02455
V98	.41976	.32120	.21304	-.11426	-.38950	.14912	-.11240	.01527
V47	.41876	.12949	-.04253	-.07148	.10254	-.04310	.24883	-.20743
V108	.16418	.79294	.14087	-.01249	-.10361	-.09534	.02354	-.01722
V95	-.06128	-.78270	-.14995	-.03829	-.08444	.05282	.00914	.06694
V13	-.06942	-.74873	-.03581	-.01643	.13835	.20322	-.12551	.06158
V121	.18229	.73927	.14617	.08573	-.06601	-.04184	-.02866	.04342
V94	.26336	.72944	.12828	-.24654	.00043	-.03497	-.07297	.19095
V38	-.16589	-.72503	-.05215	.08410	.12814	-.07021	-.08232	.12408
V36	-.08661	-.71257	-.07817	.00521	.29436	.16789	-.17319	.01189
V70	-.17065	-.70080	-.18812	.14638	.22539	.22581	.01129	.08448
V69	.25300	.69614	.17225	.00505	.12097	.03345	.06385	.25220
V76	.23257	.67649	.20226	-.06153	-.11113	-.07462	.01531	.02850
V44	.05543	.67402	.15242	-.117[illegible]1	-.10325	.00716	.02628	-.26371
V115	-.20936	-.65953	-.17622	.167[illegible]4	-.13856	.07434	-.06221	-.02661
V49	.19148	.61445	.06433	-.14659	.15334	-.01211	.02381	.29591

V28	-.23770	-.60880	-.09956	.14291	.29270	.06782	-.11837	.13001
V51	.26107	.58289	.13531	.02034	-.10912	.24376	-.00345	-.07104
V26	-.14674	-.57418	-.03605	.06739	.11193	-.02059	.12609	.03868
V46	.28262	.56080	.17438	-.12099	-.11197	.14872	-.10441	.20430
V18	-.12982	-.55220	-.10425	.25608	-.04324	.16359	.11601	.00308
V3	-.07567	-.54496	-.11094	.19148	.10384	.11013	-.12112	.22535
V22	.34140	.54185	.03294	-.10020	-.16973	-.10291	.20169	.30841
V39	.06189	.53751	.00619	.06196	-.08355	.07897	.15023	.35874
V12	.40948	.46700	.05465	-.08590	-.08801	-.03318	.30059	.22008
V14	.28768	.45461	.24292	.12986	-.10804	.12748	.27633	-.06112
V74	-.23620	-.44738	-.15699	.34355	.31276	.11070	-.13074	.00714
V101	-.19795	-.34904	-.07817	.02863	.01528	.08402	-.02689	-.23426
V92	-.29027	-.31764	-.19991	.24723	.17066	.21720	.07406	-.03224
V32	.00512	.18497	.67772	-.09004	.03069	-.07149	.20329	-.08131
V114	.13591	.21822	.66339	-.04149	.04642	.06746	-.02792	.01646
V85	.11176	.24406	.64765	-.16154	.00765	.06472	-.06918	-.01630
V120	.09039	.13916	.63322	-.03194	-.09555	.01285	-.07217	.08574
V84	.10711	.14687	.57158	-.12493	-.06976	-.24311	.27188	.10293
V79	.31908	.23712	.54846	.12775	.07765	.09290	.05039	-.23085
V100	-.20036	-.21294	-.51578	.06756	-.10767	.39573	-.11155	.02920
V104	-.32896	-.20621	-.48811	.05264	.05171	.32358	-.24807	.10530
V106	-.07288	-.09691	-.48766	-.04775	.16349	.09930	.16907	-.01391
V10	.10447	.19595	.48427	.10798	-.03590	.09845	.44851	-.08213
V58	.09596	.01453	.48171	-.10804	-.04566	-.11231	.25026	.07918
V88	.27372	.20512	.47507	-.01722	-.18486	.15832	-.01376	-.10612
V67	.01502	.02391	-.45617	.07719	.26115	.32683	-.08968	-.29174
V71	.22510	.19896	.45587	-.15939	-.17042	.00398	.13253	-.11746
V77	-.11507	-.11715	-.44137	.01483	.04579	.38024	-.09873	-.04695
V30	.01229	-.01929	.42915	-.01075	-.13226	-.05016	.10775	.07348
V89	-.07842	-.01513	-.39921	.08058	.12030	.10360	.29931	.06478
V59	-.07807	-.15012	-.36583	-.08869	.27838	.34768	-.01235	-.06922
V81	-.29001	-.21989	-.10477	.65492	.00193	.20105	.03699	-.13822
V52	-.28645	-.12029	-.08740	.57740	.12140	.10269	-.10618	.15090
V73	-.38880	-.13416	-.12623	.50881	.26960	.07391	.04059	-.32203
V24	-.09179	-.26055	-.17349	.45663	.06497	.17349	.11486	.21007
V8	.40862	.19473	.06534	-.45491	.03034	.28606	.34493	.07903
V43	.32697	.35667	.13188	-.39758	-.04248	.30235	.11372	-.19160
V57	-.20815	-.10257	-.01598	.15170	.59234	.16703	-.04329	.04617
V68	-.34083	-.15683	-.22166	-.11018	.57504	.03357	.00311	.07656
V61	-.23238	-.24492	-.22192	.06544	.57253	.07927	.04459	.05940
V102	.28751	.27616	.44842	-.09796	-.46675	.20747	.04894	.01360
V60	.00036	-.06991	-.36178	.12582	.39136	.23532	.11637	-.08399
V42	-.14778	-.22551	-.15430	-.00843	.34600	-.00924	-.12666	-.10106
V99	-.21610	-.10305	-.35950	-.07673	.07442	.56463	-.09366	-.14366
V29	-.05264	-.13232	-.07253	.11624	-.11036	.55363	-.04808	.09144
V21	-.06651	-.06628	.02917	.03395	.19713	.48637	-.11217	-.04030
V4	-.03751	-.04308	-.18412	.09439	.08574	.36432	.23189	.18138
V9	-.04432	.10523	.27246	-.04875	-.06678	-.01137	.72970	.08224
V6	.17503	.02953	-.00508	-.01951	.09238	-.09613	.68906	-.08485
V56	-.03624	-.01226	-.14477	.12695	.19000	.37397	-.47105	-.10013
V23	.10228	.02401	.10383	.03271	-.05313	-.10801	.15297	.03232
V107	-.11405	-.19326	-.27537	.23993	.25475	.13831	-.15444	.33707
V17	.19428	.09839	.19303	-.09208	.04470	-.10974	.20139	.30726