Notes and Tables to Accompany the Presentation:
Multiple Regression Analysis with
Dichotomous Outcome Variables: Issues and Examples*

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OVERVIEW

The purpose of this 'applied' presentation is to demonstrate the use of multiple regression analysis in situations where the outcome variable is dichotomous and the predictor variables are intervally scaled. The more common procedure in this situation is discriminant function analysis. However, Cohen and Cohen (1975) state:

> "A few moments of reflection will make it apparent that for the special case where two groups are to be discriminated.... the analysis reduces to a single MRC for a single dichotomous Y (which can be coded 1 - 0, or with any other pair of different values). The MRC analysis is mathematically and statistically identical with a CA when $p=1$; hence, it is identical with a DA for 2 groups. $R^2_{y.12...k}$ equals the (sole) $R^2_c (=R^2_{J_4})$ and the multiple regression equation is proportional to the discriminant function and hence perfectly correlated with it(p.442)."

Mathematical formulations can be found in Tatsouka (1975).

Issues regarding the use of the general linear model (discriminant function or multiple regression) with qualitative variables is beyond the scope of this presentation. Press and Wilson (1978) argue that logistic regression is preferable to discriminant function analysis when one or more of the discriminating variables is qualitative. However, they also state a preference for discriminant analysis estimators "if the populations are normal with identical covariance matrices."

EXAMPLE 1

The research sought to investigate the coping skills of rape victims to determine if some women may be more vulnerable to rape than others. The study investigated five domains: psychosocial competency, mental health, alcohol and drug use, cognitive resources, and physical ability. Seventy-two rape victims and 72 control women were administered psychometric instruments and a biographical inventory. Information was also obtained from significant others. The strongest domain of prediction was psychosocial competency, with the rape victim scoring lower on measures of social presence, dominance, and assertiveness, and higher on external/social locus of control. A past history of alcohol or drug abuse added to the rape-vulnerability profile. Rape victims were more likely to have a past history of psychiatric hospitalization and suicidal thoughts. They did not differ from control women on the Vocabulary subtest of the Wechsler Adult Intelligence Scale-Revised, but they scored lower on the Achievement via Independence Scale of the California Psychological Inventory. Physical ability attributes were not associated with rape vulnerability (see article).

Points:

1) choice of the stepwise model
2) acceptability of the regression approach to journals
3) presentation of the data

EXAMPLE 2

The problem of unwed adolescent pregnancy has been studied in the past primarily as a symptom of individual psychopathology. These studies yielded equivocal results. Gradually, the broader social context of pregnant teenagers began to be studied. Past research pointed to the importance of the family contributing to the problem.

The objectives of this study were to investigate whether family variables could discriminate between the families of unwed pregnant and non-pregnant teens. All teen subjects met the research criteria of being unwed, under eighteen years of age, enrolled in local high schools, and living with their families of origin. Thirty-one pregnant teen families and 28 non-pregnant teen families comprised the study sample. Each subject completed the Moos Family Environment Scale (FES). In addition, each parent completed a questionnaire which included a problem checklist, demographic information, questions about the teen's dating behavior and recent family structural changes.

The hypothesis that incongruence of perception and other family adjustment variables could differentiate the two groups was explored. Pregnant teens were found to have longer boyfriend relationships and fewer problems as rated by the parents. Their family's perceptions were more congruent regarding cohesion and mother/daughter interaction, but less congruent in terms of family conflict (tables 1 and 2).

Points:

1) choice of full model

TABLE 1

Means of Variables by Pregnant/Non-Pregnant Groups

Variable	Group	
	Pregnant (1)	Non-Pregnant (2)
Length of Boyfriend Relationship(mos.)	10.20	3.20
Conflict Incongruence	3.93	2.56
Number of Problems	.8	1.70
Control Incongruence	2.6	2.18
Cohesion Incongruence	3.26	4.0
Organization Incongruence	3.6	3.25
Mother/Daughter Incongruence	28.23	33.0
Family Changes	1.63	1.56
Independence Incongruence	2.93	3.06

TABLE 2

Summary Table of the Regression Analysis with Incongruence
of Perception and Other Family Variables

Independent Variables	Beta
Length of Boyfriend Relationship	-.43
Conflict Incongruence	-.28
Total Number of Problems	.20
Control Incongruence	-.09
Cohesion Incongruence	.13
Organization Incongruence	-.08
Mother/Daughter Incongruence	.21
Number of Family Changes	-.02
Independence Incongruence	.03

R = .67   p< .01

EXAMPLE 3

This study examined the effects of acculturation on adolescent development, specifically focusing on daydreaming as one aspect of coping and adaptation. An investigation of two samples of acculturating (Hispanic and Native American) and acculturated (Caucasian) adolescents revealed two variables that, in combination, significantly differentiated the two groups. These two variables, fear of failure daydreams and distractibility, suggested that acculturating adolescents were more likely to report guilty and fearful daydreaming themes and less likely to report concentration difficulties than their acculturated coparts (tables 3,4 and 5).

Points

1) choice of the stepwise model

Table 3

Point Biserial Correlations of Daydreaming Variables with Acculturation Index

Variables	Correlation
Frequency	.06
Absorption in Daydreaming	.01
Acceptance of Daydreaming	.16
Positive Reactions	-.14
Frightened Reactions	.04
Visual Imagery	.03
Problem-Solving Daydreams	.02
Future in Daydreams	.06
Bizarre and Improbable Daydreams	.04
Mind Wandering	-.16
Achievement-Oriented Daydreams	.07
Hallucinatory-Vividness	.08
Fear of Failure Daydreams	.33
Hostile Daydreams	.01
Guilt Daydreams	.27
Boredom	-.05
Distractability	-.12

Table 4

Summary Table of the Stepwise Multiple Regression Analysis with Acculturation as the Dependent Variable

Independent Variables	Multiple R	R Square	Change in R Square	Simp
Fear of Failure Daydreams (DM)	.33	.11	.11	.
Distractibility (DQ)	.42	.17	.06*	-.

*Variables beyond this point did not significantly account for additional between group variability (PC<05).

Table 5

Acculturating vs. Acculturated Group Means
on the Independent Variables

Variable	Means Acculturating(1)	Acculturated(2)
Daydreaming		
Frequency	35.38	36.54
Absorption in Daydreaming	52.67	52.86
Acceptance of Daydreaming	30.82	28.66
Positive Reactions	30.59	28.16
Frightened Reactions	38.88	39.64
Visual Imagery	32.76	33.38
Problem-Solving Daydreams	30.03	30.34
Future in Daydreams	30.71	31.96
Bizarre & Improbable Daydreams	41.38	41.98
Mind Wandering	32.32	30.24
Achievement-Oriented Daydreams	37.44	38.86
Hallucinatory-Vividness	40.68	42.30
Fear of Failure Daydreams	34.68	39.48
Hostile Daydreams	34.15	39.24
Guilt Daydreams	41.85	46.18
Boredom	41.32	40.60
Distractibility	36.26	34.66

NOTE: A high score on each daydreaming scale means that respondents disagreed with the scale's major theme. For example, a high score on Fear of Failure Daydreams means that the subject reports few fear of failure daydreams.

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