

Proceedings of the Iowa Academy of Science

Volume 63 | Annual Issue

Article 62

1956

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Recommended Citation

Suhr, Virtus W. (1956) "Comparing Inventory Items by Use of IBM Punch Cards," *Proceedings of the Iowa Academy of Science*, 63(1), 581-585.

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Comparing Inventory Items by Use of IBM Punch Cards*

By VIRTUS W. SUHR

INTRODUCTION

The number of motor vehicles using the streets and highways of the United States has been increasing at a phenomenal rate. Currently there are about 60,000,000 vehicles on the road. It is estimated that the figure will be 81,000,000 by 1964 (5). About 78 per cent of all passenger transportation is by private automobile. The average number of passengers per vehicle is 1.8 (3). An estimated 75,000,000 licensed drivers (1) drove over 500 billion miles during 1954 (5).

The fatality record of 38,300 for 1955 (2) may be exceeded this year from available reports. With the added volume of traffic the number of fatalities is likely to increase. Education of the driver seems to be one of the best long-range approaches to the problem. In order for this to be done adequately, a thorough analysis of the physical, mental and emotional aspects of the driver is needed. With this objective in mind several inventories are being explored at the Driving Research Laboratory in an attempt to find items that will differentiate sufficiently for use in driver improvement program.

Extensive analysis of specific inventory-item information on large numbers of any extended form by ordinary methods would be practically impossible due to the volume and labor involved. To overcome this obstacle it is necessary to put the data into a form in which large numbers of completed inventories can be item analyzed easily and quickly but without losing completeness and individuality. A system using IBM punch cards seemed to meet all of these conditions when a counting or statistical sorter is available.

The IBM punch card, as shown in Figure 1, is known to most research workers. Data, after having been converted into numerical or alphabetical form, can be economically recorded on the card. The cards can then be easily sorted and the information thereon reproduced, tabulated and cross-tabulated in a variety of ways as needed. Complete intercorrelations, multiple correlations and even factor analysis may be computed with very little resort to ordinary calculators.

*Partially made possible by an Allstate Grant for driving research at Iowa State College.

[illegible]

Figure 1

PROCEDURE

In order to transfer the data from the original inventory to the punch card, it is necessary to code in numerical or alphabetical form. In the present application this is done by assigning a number to each of the various responses to the inventory items. The IBM punch cards, usually used, have a total of 80 columns, each of which has a maximum of 12 punches. These are numbered, from top to bottom, zero through nine with X and Y being used to indicate the 11th and 12th punches.

Before the cards can be punched, a code sheet should be prepared listing the variables and the columns reserved for each. A sample of code headings is shown in Figure 2.

These code headings are arranged to correspond to the items included in the inventory form. The first four columns indicate the serial number of the subject. This is needed to facilitate location of the card in case it is lost or damaged or is to be reproduced. In one study under way at the Driving Research Laboratory columns 5 through 47 were used for biographical data such as age, years of school completed, marital status, etc. Column 48 was used to identify the various sections of the inventory. The data from attitude-personality items were punched in columns 49 through 78 or as needed for sections of the inventory. In this particular study 162 columns were used.

The coding is done by assigning a number to each response under an item. For example, to the item *WEAR GLASSES*, the subject may be asked to answer *YES*, *NO*, or *WHEN READING* as the case may be. As shown in the code headings (Figure 2), the response to the item *WEAR GLASSES* is entered in column 17. This may be in 1, 2, or 3. When the *YES* response is indicated by the

CODE HEADINGS

1. Serial Number—Columns 1-4
2. Age—Columns 5-6
3. Sex—Column 7
4. Height—Columns 8-9
5. Weight—Columns 10-12
6. Years of School Completed—Columns 13-14
7. Marital Status—Column 15
8. Number of Children—Column 16
9. Glasses—Column 17
10. Years of Military Service—Column 18
11. Rank on Discharge—Column 19
12. State—Columns 20-21
13. Year of Car—Columns 22-23
14. Risk Classification—Columns 24-25
15. Encumbrance—Column 26
16. Earned Car Years—Column 27
17. Bodily Injury Premium—Columns 28-29
18. Bodily Injury Claims—Columns 30-31
19. Bodily Injury Losses—Columns 32-36
20. Property Damage Premium—Columns 37-38
21. Property Damage Claims—Column 39
22. Property Damage Losses—Columns 40-43
23. Time in Months to First Accident—Columns 44-45
24. Hour of Accident—Columns 46-47
25. Deck Number—Column 48
26. Inventory Items—Columns 49-78

Figure 2

number one, the *NO* by the number two, and *WHEN READING* by the number three, the completed coding for this item will appear as shown in Figure 3.

CODING

COLUMN

17

ITEM

Wears Glasses:

1—Yes

2—No

3—When reading

Figure 3

The code headings by columns together with the response numbers constitute the code manual. The data on the original inventories are then transferred to prepared sheets where responses are recorded in numerical form. Figure 4 shows transcribed data on a code sheet.

The numerical information is then punched on the card by key punches. Figure 5 shows a punch card on which the transcribed raw

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YOUNG DRIVER INVENTORY
CODE SHEET

Coded by _____
Punched by _____
Checked by _____

Serial Number			Age	Sex	Height	Weight	Last Grade of School Completed	Marital Status	Number of Children	Classes	Military Service	Rank on Discharge	Status						
/	7	3	9	1	8	7	0	1	6	5	1	2	2	0	2	0	0	3	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

State	Year of Car	Risk Classification	Social Insurance	Earned R. Years	Bodily Injury Premium	Bodily Injury Claims	Bodily Injury Losses				Property Damage Premium	Property Damage Claim							
6	4	6	2	7	1	4	1	0	0	0	0	0	4	6	0	0			
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Property Damage Losses	Months to First Accident	Hour of Accident	Dock Number	Inventory Items															
0	0	0		2	1	3	2	0	1	3	9	2	2	2	9	1			
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

Inventory Items																			
2	0	0	9	4	0	0	0	0	0	0	0	0	0	0	0				
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Figure 4

IBM PUNCH CARD
Containing Inventory Data

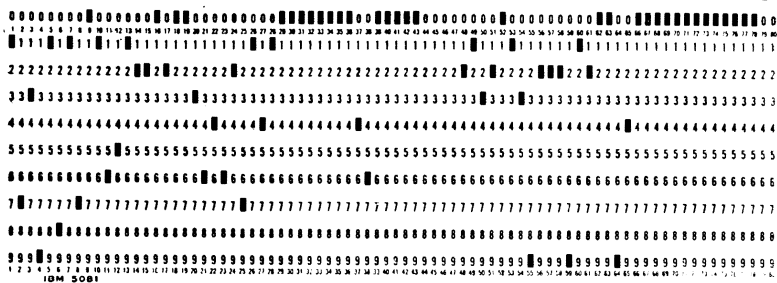


Figure 5

data shown in Figure 4 have been transferred.

As soon as all the data have been transferred to punch cards, that is one card for each completed inventory section, the punch cards can be sorted and tabulated and the desired statistical procedures used for item-analysis and evaluation.

SUMMARY

The use of IBM punch cards provides a means for item-analysis of a large volume of data easily and quickly. Through a process of coding whereby the original responses are converted to numerical form, the data can be transferred from the marked inventories to IBM punch cards. The system is applicable to either multiple-choice, true-false, or other multiple-response or stereotype answers.

The responses to the items can be counted by simply sorting the cards and recording the frequencies. A counting or statistical sorter greatly facilitates this procedure. Further statistical analyses can be made as desired according to the nature of the problem.

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