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An Application of the Coombs Preference Scales for Family Size and Sex Composition

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This research note discusses new measures of family size and sex composition preferences. The scales, developed by Clyde H. Coombs, Lolagene C. Coombs and Gary H. McClelland (forthcoming), are based on unfolding theory and conjoint measurement. The scales obtained give measures of a respondent's underlying preference structure which may be different from her first stated choice, a significant factor in fertility analysis and prediction.

The scaling technique is based on obtaining the respondent's order of preference on a series of families varying in size and sex composition. Respondents are asked to rank the 16 possible family compositions having different numbers of boys and girls, ranging from 0 to 3 boys and 0 to 3 girls. This allows for a maximum size of 6 children and 3 of each sex. However, further extensions of the range of numbers of children are possible. From the completed preference order, psychological scales (called I-scale) ranging from 1 to 7 are developed. IN1 (an I-scale for number of children) indicates a

preference for a very small family size and IN7 is indicative of a preference for a very large family size. The I-scale number must not be interpreted as the preferred family size. It only shows the extent of a size bias in terms of the respondent's position on a psychological scale between 1 and 7. IS1 (I-scale for sex of children) indicates a strong girl bias and IS7 indicates a strong preference for boys; IS4 indicates a preference for equal number of boys and girls.

The following is an illustration of how I-scale numbers are derived, given the respondent's rank order of preferences. Figure 1a shows the diagonals necessary in the derivation of the I-scales. From the matrix in Figure 1b, the I-scale number for preferred family size is derived from the diagonal reading from her 16th choice in the upper left corner to her 2nd choice in the lower right, these being families with sex difference held constant at zero. Her first choice is for 4 children, 2 boys and 2 girls. Her next choice on the diagonal is 6 children, 3

boys and 3 girls, followed by 2 and finally for 0. A preference order of 4 6 2 0 corresponds to an I-scale number 6 (IN6), indicative of an underlying preference for a fairly large family. The I-scales for sex preference are read along the other diagonal from her 10th choice on the upper right corner to her 15th choice on the lower left, these being families with number of children held constant at 3. This preference order is read as 1 2 (boys, girls), 2 1, 0 3 and 3 0 which gives an I-scale number 3 (IS3), indicating a mild girl bias. Table 1 gives a translation of preference orders.

Unfolding theory and conjoint measurement

The unfolding technique (Coombs 1974) may be regarded both as a scaling criterion and as a scaling method. As a scaling criterion it may be used to test the hypotheses about the nature of the judgment process in preferential choice behavior; it may also be used to construct psychological scales, in which case it is a scaling method.

The theory of preferential choice is based on the idea that an individual may have an ideal point on a variable x , such as the number of children, and that an individual's preference

falls off as x either increases or decreases. Such an ideal point may be thought of as a peak, and the individual's other preferences as being on either side depending on whether they are greater or lesser than the ideal and at varying distances depending on how far they are psychologically from the ideal.

To use the illustration of preferences about family size and composition, an individual may be said to have a bias towards a larger or smaller family size, or toward male or female children, which can be represented by a point on a continuum or scale. This is the individual's ideal point and the rank order of preferences is in order of increasing distance from the ideal. The scale is called a psychological scale because the distances between points are subjective quantities, e.g., two people may say they would most prefer to have 2 children, but one person would rather have 6 than none, and the other may prefer the opposite. Thus, for one individual the psychological distance to 6 children is less than to 0; for the other individual, the distances are reversed. In other words, two individuals stating the same first choice may have very different preference structures as revealed by their successive choices.

Table 1
I-scale numbers for preference order
for number and sex of children

Number preference order	I-scale number	Sex preference order*
0 2 4 6	11	03,12,21,30
2 0 4 6	12	12,03,21,30
2 4 0 6	13	12,21,03,30
2 4 6 0	14	12,21,30,03
4 2 0 6	14	21,12,03,30
4 2 6 0	15	21,12,30,03
4 6 2 0	16	21,30,12,03
6 4 2 0	17	30,21,12,03

*03 read as 0 boys, 3 girls, etc.

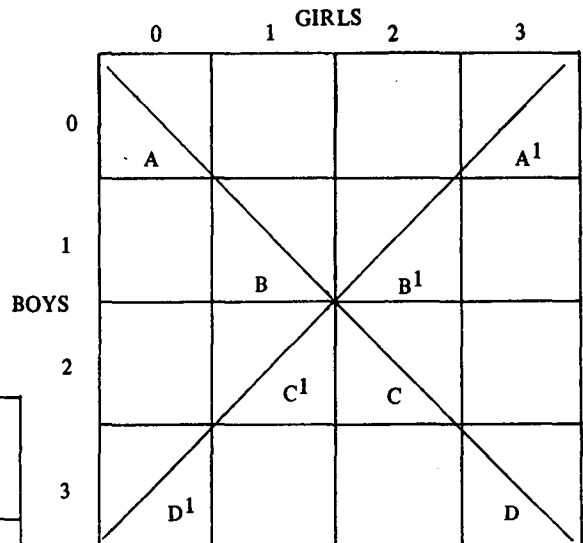
Briefly, a preference structure is obtained as follows. Supposing that a preference for number of children ranges from 0 to 6 as shown in Figure 2, we can divide this range by the six midpoints between the four levels of N which would occur on the diagonal used for size preference (N = 0, 2, 4 or 6). These midpoints divide the scale into seven intervals, numbered in order from left to right and labelled with I-scale numbers. Each of these intervals or I-scale numbers correspond to a unique preference ordering, as shown at the bottom scale

of that figure. An individual whose ideal point for N (his most preferred number on the diagonal) falls in one of these intervals must have an ordering on N that uniquely corresponds to the interval. This can be thought of in terms of the particular midpoints he must cross psychologically to get his particular preference order. As an example, our respondent in Figure 1b, whose first preference on the number or size diagonal is 4, must have crossed all midpoints to the left of 2/6. He has not crossed the 4/6 midpoint, because he prefers 4 to 6

Choice matrix for family size and sex preference

b. Illustrative matrix of preference orders

		GIRLS			
		0	1	2	3
BOYS	0	16	12	7	10
	1	13	8	6	4
	2	14	9	1	5
	3	15	11	3	2



Main diagonals, with four options each;

A - D determines IN scale
 A¹ - D¹ determines IS scale

Figure 1
 Illustrative Matrices for Family
 Size and Sex Composition

children, not the reverse. Thus he must be in the sixth interval on the scale, which corresponds to the location of his preference order 4 6 2 0 on the bottom line of the figure. The difference between what is revealed by a first choice and that revealed through the I-scale, or underlying preference structure is the reason why it is necessary to obtain more than just a first choice in getting preferential judgments.

The theory of conjoint measurement (L.C. Coombs 1974) provides tests of independence and permits the testing of rules of combination

of the underlying variables (such as the number of boys and girls) utilizing only ordinal preferences. Such rules of combination are theories of how people think about sex of children in relation to numbers of children, and hence conjoint measurement provides a very useful framework for analyzing and measuring the structure of their preferences.

Usefulness of the measures

The I-scale preference measure reflects not only the respondent's stated first choice but

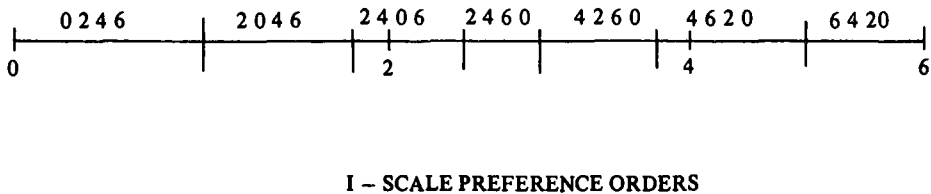
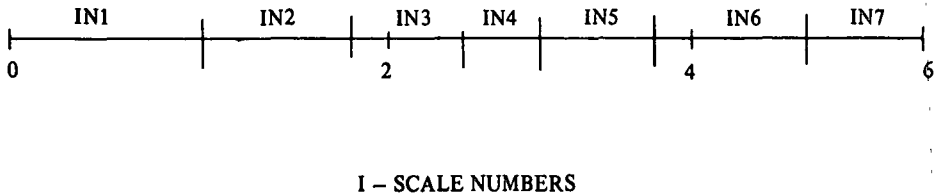
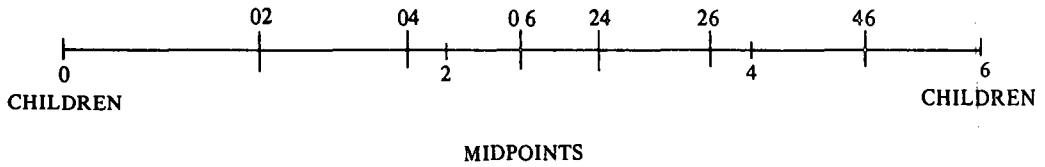


Figure 2
Size Bias Index

also an underlying structure which may be different. Differences between first choices and underlying preferences can be seen in Figure 3 for data collected in Manila and some neighboring provinces.¹ More than a third of the sample indicated a first choice of 4 children. However, the respondents making this choice vary in I-scale, from 2, indicating a preference for a small family, to 7, indicating a preference for a very large family. For purposes of predicting fertility behavior, such differences can be very significant. We may think of those with the higher I-scale values as having a tendency for a large family. A study made in Detroit, Michigan from 1962-1967 showed a positive relationship between the position on the preference scale and the number of pregnancies the respondents had in the follow-up period. Women whose underlying preference structures are characterized by high I-scale values had more pregnancies and births in the prospective period and

expected to have larger completed families than those with low I-scale values (L.C. Coombs forthcoming).

There may also be differences between the stated first preference for sons and underlying sex preference. Figure 4a shows such differences. Respondents may state as first preference equal numbers of boys and girls and later reveal through the I-scales a strong girl bias (ISI) or strong boy bias (IS7). The Philippine data show that the first choice was strongly for balance, with 60 percent of the sample stating as first choice equal numbers of boys and girls. Again, these respondents vary in I-scale values, from 1, indicating a strong preference for girls, to 7, indicating a strong preference for boys. The distribution of IS-scale values shows that girls are the more preferred sex.

Another interesting point is the contradiction which may underlie a respondent's

Total	3	7	16	144	120	55	45	12	402
6							33	5	38
5	1		1	5	4	4	6		21
4		1		20	87	35	3	3	149
3	2	1	8	35	26	15	3	2	92
2		4	7	76	2			1	90
1		1		8	1	1		1	12
0									
	1	2	3	4	5	6	7	8*	Total

I-scale for number of children (IN)

*Preferences did not scale

Figure 3
First choice on number of children by size bias index

a. Sex difference in first choice by sex bias

Total	18	29	92	129	74	24	12	24	402
-3	1			1					2
-2	3	1	1	4		1	1		11
1	2	13	25	20	1			4	65
0	12	13	64	75	48	16	7	15	250
1		2	1	22	22	5	1	4	57
2			1	7	2	3	2	1	16
3							1	1	1
	1	2	3	4	5	6	7	8	Total

First choice
Difference between B & G

I-scale for sex bias (IS)

b. Size bias by sex bias

Total	3	7	16	144	120	55	45	12	402
8			1	6	8	3	3	3	24
7				1	4	2	4	1	12
6	1			9	8	4	1	1	24
5		2	3	20	29	10	10		74
4		4	6	57	35	16	8	3	129
3	1		5	37	27	10	11	1	92
2	1		1	11	5	7	3	1	29
1		1		3	4	3	5	2	18
	1	2	3	4	5	6	7	8	Total

I-scale for number (IN)

Figure 4
Sex Preference Comparisons

Table 2
Percentage distributions of I-scale for number (with sex controlled),
and for sex (with number controlled) for United States,
the University of Michigan, Taiwan (pretest)
and Philippines

I-Scale Number	Number preference/sex controlled			
	United States	University of Michigan	Taiwan	Philippines
1	3	8	0	1
2	18	21	0	2
3	20	10	0	4
4	25	37	36	37
5	17	12	41	31
6	9	7	21	14
7	9	5	2	12
Mean I-scale number	4.0	3.8	4.9	4.8
	Sex preference/number controlled			
1	2	2	0	5
2	9	2	0	8
3	19	18	1	24
4	20	20	8	34
5	27	43	46	20
6	21	11	39	6
7	2	5	4	3
Mean I-scale number	4.3	4.5	5.3	3.8
Number of cases	(138)	(364)	(179)	(378)

Source: United States, University of Michigan, and Taiwan data from Lolagene C. Coombs (1974).

preference for total number of children and preference for a given sex. From our data in Figure 4b, for example, a respondent with an IN1, a preference for a very small family, also had a strong preference for boys, IS6. Individuals, such as this respondent, may be in a dilemma, and may go beyond their preferred number of children if they do not get the number of children of a particular sex they want.

The indices can also be used to make comparisons of preference structures of differ-

ent cultures. Comparing the distributions in Table 2, we find how these populations differ in their range on the measures. In the University of Michigan, United States, or Philippine data, we find the full range from IN1 to IN7 for number of children; in Taiwan,² there are no respondents at IN1 or IN2 and only one at IN3. Both the Taiwan and Philippine samples show more women scaling in the large family range but differing in their sex preference structures; Taiwan women are to be found more in the boy-preference range. The mean scores also suggest cultural variations.

Notes

Dionisia de la Paz was an instructor at the Population Institute when she undertook this study. Her research work included population estimates and projections, family size and sex preference of women.

1. The areas covered are the municipalities of Angono, Binangonan, Cardona and Pililla in the province of Rizal; Cabuyao and Sta. Rosa in Laguna; Imus, Magallanes and Naic in Cavite and Tanauan, Batangas City and Lipa City in Batangas.

2. The Taiwan data are based on pretest samples, and are not representative.

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