A Second Scoring Mechanism to Study Change

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Fullan (1991) reminds us that "change is multi-dimensional" and that it can "vary within the same person as well as within groups." Yet research frequently conceptualizes change solely in terms of differences in status. Researchers gather data over two time points, compute the status for each time point, and proceed to look for differences in status over time.

Consider the example of a survey of 7 items designed to measure teacher dynamism in 89 urban elementary schools. The survey administered in 1991 and 1994 consisted of items that probed aspects of teacher behavior ranging from the more passive behaviors like acceptance of instructional goals and familiarity with school improvement plans, to more active behaviors like voicing concerns, enforcing rules, and helping to develop school improvement plans. Teachers responded to these items using a four-point rating scale, "Strongly Disagree, Disagree, Agree, Strongly Agree." These responses were scored 1,2,3, and 4 respectively. To study how

Figure 1: Teacher Dynamism - Patterns of Change 1991-1994

Acquiescence : Average94 - Average91

	Decrease (-)	No Change (0)	Increase (+)	
		(1 school) 1 2 3 4 All Round progress	(4 schools) 1 2 3 4 Laggards Progress	Increase (+)
Teacher Dynamism Average94 - Average91	1 2 3 4 Radicalizing	(58 schools) 1 2 3 4 Static	(21 schools) 1 2 3 4 Homogenizing	No Change (0)
	1 2 3 4 Moderates Deteriorate	(3 schools) 1 2 3 4 All Round Deterioration	(2 schools) 1 2 3 4 Progressives Deteriorate	Decrease (-)

(Decrease column top cell: 1 2 3 4 Moderates Progress)

Note:
1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree
Laggards= Those who pick Categories 1 & 2 (Strongly Disagree, Disagree)
Moderates= Those who pick Category 3 (Agree)
Progressives= Those who pick Category 4 (Strongly Agree)
Arrows represent movement from one category into another
The topmost entry in each cell represents the number of schools

teacher dynamism in schools had changed from 1991 to 1994 we used BIGSTEPS (Wright & Linacre, 1995) to assign a measure of dynamism to each teacher, aggregated these measures to the school level, and computed differences in average measures over time. T-tests at the 5% significance level showed that there was a significant increase in teacher dynamism in 5 schools (6%), a significant decrease in another 5 schools (6%), and no significant change in 79 (88%) schools.

While interesting, the analysis is limited in that it focuses only on the magnitude and direction of change. We learn nothing about the patterns of change. For instance, the condition of no change can occur in one of two ways. "It would result if everyone is doing about the same as before" or if "gains in some parts are being canceled out by losses elsewhere" (Namboori et al., 1993). Similarly, we do not know what patterns underlie schools where teacher dynamism increased. Specifically, we do not know whether improvement was universal or if it was restricted to certain groups of people.

The discussion that follows outlines how two scoring mechanisms can be used in conjunction with each other to study patterns of change. This follows from Guttman (1950) who proposed that a construct be investigated from two points of view, "a content scale which ranks people from high to low on a single continuum" and "an intensity scale which ranks people from high to low on a single intensity continuum." The technique used BIGSTEPS (Wright & Linacre, 1995) and the following scoring mechanisms to create two measures for each person from the same set of items, a measure of teacher dynamism and a measure of acquiescence.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Teacher Dynamism Scoring	1	2	3	4
Acquiescence Scoring	0	0	1	0

School means were computed for teacher dynamism and acquiescence for 1991 and 1994, and T-Tests performed for both aggregate measures. This allowed us to classify each school into one of three categories (significant increase, significant decrease, and no change) for teacher dynamism and acquiescence. By considering changes in acquiescence alongside changes in teacher dynamism, we can identify 9 different patterns of change (Figure 1). For example, a decrease in acquiescence from 1991 to 1994 suggests movement out of the "Agree" category. If the decrease in acquiescence occurs alongside an increase in teacher dynamism, we can deduce that the net movement must be from a less favorable category into a more favorable one (cell labeled "Moderates Progress"). If teacher dynamism remains the same while acquiescence decreases, we can deduce that the movement out of the "Agree" category is bidirectional (Cell labeled "Radicalizing"). The level of teacher dynamism remains unchanged because gains in one direction (movement from Agree to Strongly Agree) are offset by losses in the other (movement from Agree to Disagree and Strongly Disagree).

We are now able to expand our original classification of schools. Of the 79 schools classified as showing no change in teacher dynamism levels, 58 can be considered static with respect to category use patterns. These schools did not show a net movement either into or out of the "Agree" category. In the remaining 21 schools there was a homogenizing trend, i.e., a net movement into the "Agree" category from the more positive "Strongly Agree" category as well as from the negative "Strongly Disagree" and "Disagree" categories. Two patterns of change occurred in the 5 schools that showed a decrease in levels of teacher dynamism. In 3 of these schools there appeared to be an all-around deterioration. Two schools showed localized deterioration, characterized by a movement out of the "Strongly Agree" category to the "Agree" category. Finally, among schools which showed an increase in teacher dynamism, one showed all-around improvement, while 4 schools showed restricted improvement, characterized by a movement out of the "Strongly Disagree" and "Disagree" categories into the "Agree" category.

References:

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"What the human sciences require for more dramatic progress [is] not simply more data (of the same kind), as so many empiricists have stated, but new instrumentation for obtaining data, or reasonable theoretical restrictions of data domain so that more exhaustive explanatory possibilities can be tried." Ackermann, John R. Data, instruments, and theory: a dialectical approach to understanding science. Princeton, New Jersey: Princeton University Press, 1985, p. 169.

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