Meaning and the Hierarchical Complexity of Language (Education as play)

Paper presented at the 1998 Symposium of the Jean Piaget Society, Chicago

Theo Linda Dawson

University of California at Berkeley

The being of all play is always self-realization, sheer fulfillment, energia which has its telos within itself (p. 113, Gadamer, 1989).

This research represents an explicit effort to apply a relational approach (as described by Overton, in press) to investigating the relationship between the construction of meaning and the hierarchical complexity of language. The dialectic is played out in two important ways. First, an attempt is made to distinguish between the hierarchical complexity of linguistic performances and their conceptual content, in order to examine the ways in which they interact with one another to produce particular meanings. Second, these relationships are explored with both quantitative and qualitative methods of analysis in a deliberately iterative, "checks and balances," process in which theory guides data collection as well as the choice of instruments for organizing and interpreting data, and the resulting insights, in their turn, inform theory.

The data are from a larger study of the development of evaluative reasoning about education. They were collected in open-ended, clinical interviews (for a description, see Armon, 1984) from 153 respondents, each of whom was asked, as an opening question, "What is a good education?"
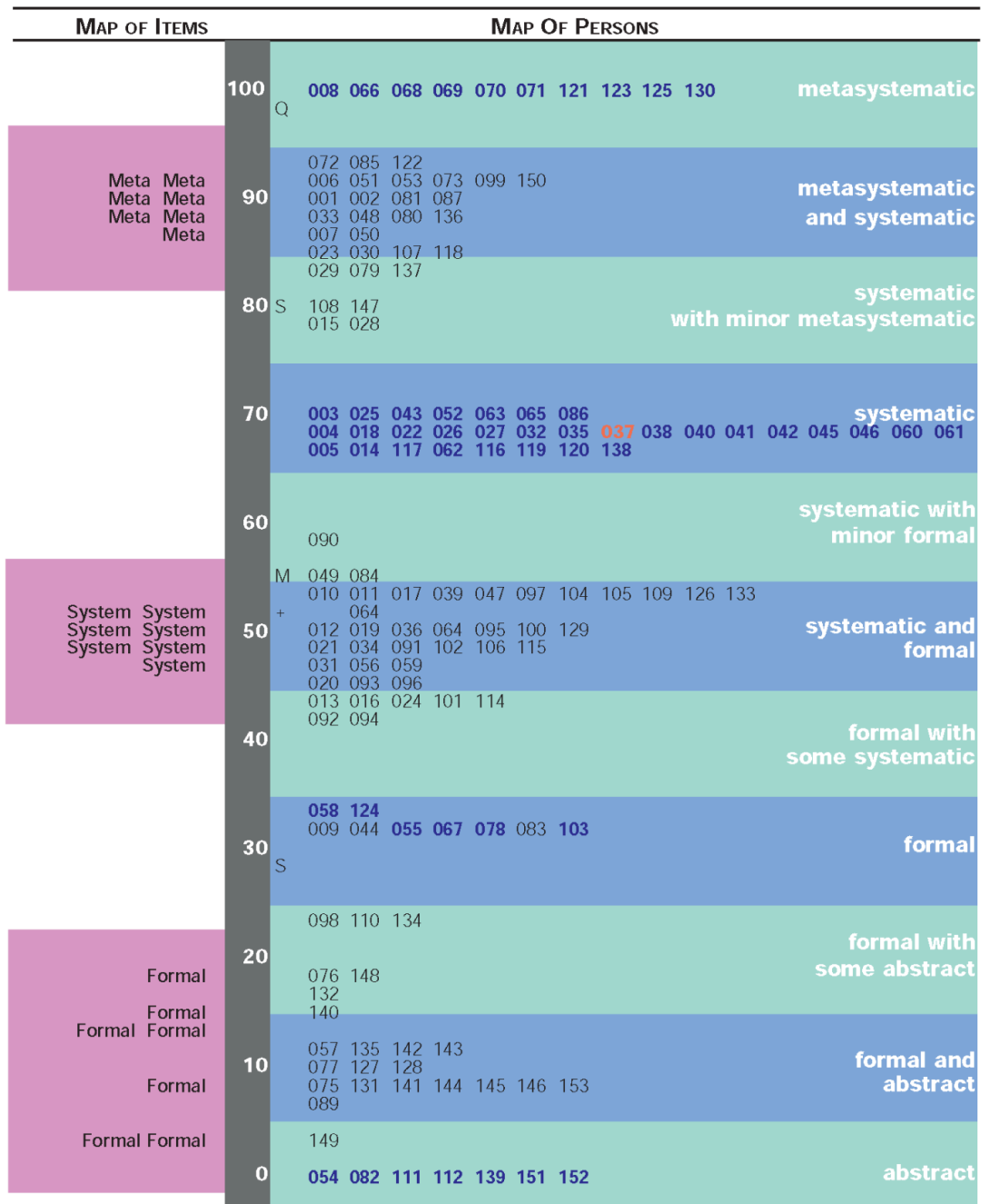
To examine the hierarchical complexity (or stage) of the language employed in the arguments constructed by respondents, the interviews were divided into 'scorable' segments, defined as complete (or as complete as possible) arguments on a given issue or theme. Interviews provided from 2 to 15 scorable segments, depending on their length and the number of issues raised by individual respondents. Segments were sorted alphabetically and scored for order of hierarchical complexity by a single blind rater, employing Commons' General Stage Scoring System (GSSS) (Commons, Richards, with Ruf, Armstrong-Roche & Bretzius, 1983;

Commons et al., 1995). Estimates of participants' stages of performance were generated with a partial credit analysis (a member of the Rasch family of models; see Dawson, in preparation for details about their application to this data). The results of this analysis, in addition to providing the person measures (stage estimates), furnished evidence that within the present domain of thought only two types of stage performance are expected to occur between the abstract and metasystematic orders of hierarchical complexity. These are (1) consolidated performances, in which all statements of a respondent are scored at the same stage, and (2) transitional performances, in which there is a mixture of performances at two adjacent stages. On the dimension of hierarchical complexity, performances are both systematically ordered across respondents and consistent within respondents. As shown in Figure 1, a sharply step-like pattern, with large gaps between both the difficulty estimates for stages and performance estimates for persons, results when these are modeled. This is consistent with reports from analyses of stage of performance in the domains of moral reasoning and evaluative reasoning about the good (Dawson, 1997; 1996; 1998), though the step-like structure is more pronounced in the present instance. This more pronounced step structure suggests that the GSSS, in its deliberate focus on form rather than content, more efficiently detects differences due to orders of hierarchical complexity than the concept-matching instruments employed in the other studies.

Figure 1

Stages of Evaluative Reasoning About Education
Item and Case Map

153 Persons, 7 Items Analyzed, 3 cases with 0 scores not shown, Reliability of case estimates = .87

MAP OF ITEMS

MAP OF PERSONS

100 Q	008 066 068 069 070 071 121 123 125 130 — metasystematic
Meta Meta Meta Meta Meta Meta Meta **90**	072 085 122 006 051 053 073 099 150 001 002 081 087 033 048 080 136 007 050 — metasystematic and systematic
80 S	023 030 107 118 029 079 137 108 147 015 028 — systematic with minor metasystematic
70	003 025 043 052 063 065 086 004 018 022 026 027 032 035 037 038 040 041 042 045 046 060 061 005 014 117 062 116 119 120 138 — systematic
60	090 — systematic with minor formal
System System System System System System System **50** M + 	049 084 010 011 017 039 047 097 104 105 109 126 133 064 012 019 036 064 095 100 129 021 034 091 102 106 115 031 056 059 020 093 096 — systematic and formal
40	013 016 024 101 114 092 094 — formal with some systematic
30 S	058 124 009 044 055 067 078 083 103 — formal
20	098 110 134 — formal with some abstract
Formal Formal Formal Formal	076 148 132 140
10	057 135 142 143 077 127 128 075 131 141 144 145 146 153 089 — formal and abstract
Formal Formal	149
0	054 082 111 112 139 151 152 — abstract

Information about the stage or hierarchical complexity of a given performance is useful only when it is associated with particular meanings. As a consequence, many previous researchers have chosen to examine stage only as it is reflected in meaning (conceptual content). In contradistinction, one of the hypotheses prompting this research is that the relationship between meaning and hierarchical complexity can be more fully understood if an attempt is made to examine them with some degree of independence.

Because the GSSS does not rely on particular conceptual content, it was possible to conduct a separate analysis of the explicit propositional content of the interviews. The data generated 2424 propositions, coded into 644 categories. Coding criteria are included in Table 1.

Good Education Concept Coding

CRITERIA	EXAMPLE
	A good education is one in which you are taught something you can use in your life. You learn on your own or someone teaches you. You carry this education through your life. Talking to other people is an education. Education is not is not just a bunch of facts. That reminds me of a course in physics I really liked.

CRITERIA	EXAMPLE
The concept applies to the subject of good education if it meets one of two standards. a. From the point-of-view of the participant this concept is a feature, result, or element of a good education; b. From the point-of-view of the participant this concept is a feature, result, or element of a bad education.	**Meet criterion (a):** 1. A good education is one in which you are taught something you can use in your life. 2. [A good education is one in which] you learn on your own or someone teaches you. 3. [A good education is one in which] you carry this education through your life. 4. Talking to other people is [good] education. **Meets criterion (b):** 5. [Good] education is not is not just a bunch of facts. **Does not meet criterion (a) or (b):** 6. That reminds me of a course in physics I really liked.

CRITERIA	EXAMPLE

Each concept has an irreducible meaning. A series of concepts, strung together without a claim that they are part of a single, larger concept are treated as separate concepts, while a concept that represents a non-additive synthesis of less complex concepts, such that it has a meaning distinct from its elements, is treated as a concept in its own right. The elements of this larger concept, if explicitly listed by the participant, are also coded as separate concepts. Including all elements in this way, ensures that no particular level of conceptualization is priveledged in the concept analysis.	1. A good education is one in which you are taught something you can use in your life.
	2. [A good education is one in which] you learn on your own or when someone teaches you.
	   2a. [A good education is one in which] you learn on your own.
	   2b. [A good education is one in which] you learn when someone teaches you.
	3. [A good education is one in which] you carry this education through your life.
	4. Talking to other people is [good] education.
	5. [Good] education is not is not just a bunch of facts.

CRITERIA			
The concept is assigned to a concept category. The category may be one of a list of already existing categories, or it may be created for the current concept. Criteria used here are: a. A concept should not be assigned to any existing category if doing so would require ignoring some aspect of its meaning. b. A concept should not be assigned to an existing category if it lacks any aspect of the meaning present among the other concepts assigned to that category.			

Concept	#	Category
1. A good education is one in which you are taught something you can use in your life.*	102	Is useful in life [similar to 3?]
2a. [A good education is one in which] you learn on your own.	025	Learn independently
2b. [A good education is one in which] you learn when someone teaches you.	002	Learn from being taught
3. [A good education is one in which] you carry this education through your life.	343	Can be carried through life
4. Talking to other people is [good] education.	369	Is talking to others
5. [Good] education is not just a bunch of facts.	046	Is not just facts

These data were first examined by ordering propositions by the estimated stage of performance of respondents. This initial attempt to bring the results of the structural and content analyses together led to some interesting insights. The first of these is that some propositions appear at an early stage and then disappear, while others emerge early and continue to be found across a range of stages—sometimes across the entire spectrum of development examined here. Figure 2 shows the distribution of a set of 33 propositions selected because they appear to relate to one metaphorical strand of meaning, education as play. There are several possible reasons for these patterns. (1) Some propositions may fall into disuse at higher stages because their meanings have been integrated into new constructions such that the root meanings are no longer interesting or attractive. Perhaps, for example, a child who connects learning as a good with certain kinds of play (at the abstract level) is less likely to assert that playing, in and of itself, is what makes education good. (2) Propositions that continue to occur in explicit form across a range of stages may do so because they continue to be useful as a means for explaining the meanings of new constructions. For example, one metasystematic performer (a political analyst) illustrated all of his more complex assertions with a series of concrete examples. (3) Some propositions may occur across several stages because they represent strands of meaning akin to the root metaphors described by Lakoff (1994). (4) Another possibility is related to the fact that one of the requirements of the coding process was that propositions were to be coded into a given category only when explicitly present. Failure to take into account implicit meanings may mask the presence of some concepts. Finally, (5) some propositions may occur across multiple stages because of a failure, during the coding process, to distinguish subtle differences in meaning.

Figure 2

Education as Play by Stage*

A good education...	Number of Occurrences by GSS Stage of Performance				
	Concrete	Abstract	Formal	Systematic	Metasystematic
includes play.	1				
includes friends/friendship.	1				
is fun.	1				
is one in which teachers give parties.		1			
includes recess.		3			
is one in which everybody is nice/gets along.		3	1		
is not too routine/repetitive.		3	2		
includes activities outside of class.		1	1		
is not boring.		7	8	1	
includes learning through play.		1	4	2	
stimulates desire/curiosity/interest in learning.		2	3	12	2
is based on student likes/prefs.		1	15	9	2
includes games/projects.		3	1		1
requires interested/motivated/curious students.		1	6	8	3
is one in which learning is made interesting.			12	6	2
is one in which learning is fun/enjoyable/entertaining.			16	3	2
is one in which students are encouraged to ask questions.			3	4	5
is inspiring.			2	3	1
includes social interaction.			4	10	8
is stimulating/involving/engaging.			1	6	6
includes active/experiential learning.			4	14	6
requires that students interact with their environment.				1	
requires that students have an adventurous attitude.				1	
supports learning for the sake of learning.				3	2
promotes exploration.				1	1
includes conversation/discussion.				4	5
is one in which testing is an opp. to show off learning.					1
is one in which teaching involves constant testing.					1
is one in which students are absorbed in dialectic.					1
is not frightening.					2
incorporates socratic dialogue.					2
includes cooperative learning opportunities.					2
encourages a spirit of enquiry.					2

*Explicit coding

A second pattern that emerges upon examination of the distribution of propositions is that some propositions occur more often than others. They are, in a sense, more "popular." Some of the cells in Figure 2 are inhabited by only one performance, while others have 14 or 16. There are several possible explanations for this pattern. (1) The more populated categories may be more central to defining the construct; (2) cultural or informational factors may influence what aspects of a thread of meaning have more salience; or (3) the interviewer may have inadvertently influenced performances by emphasizing some aspects of a construct over others in follow-up questions.

The graphic representation of the data in Figure 2 does not, in and of itself, take us much further than these observations, however. We can neither determine from this level of analysis how propositions might be related across stages, nor whether the propositions

selected all belong to the variable we're attempting to delineate. To investigate how particular meanings unfold across stages, a second layer of analysis was conducted.

First, the propositions that appeared to be related to the metaphor, education as play, were sorted as in Figure 2, by the stages at which they first came into use. Second, the pool of propositions was reduced by collapsing the most specific propositions occurring at a given stage into more general propositions that share much of the same meaning. For example, "A good education is one in which teachers give parties" was collapsed into "A good education is that includes playing games/doing fun things." Third, beginning with propositions found at the metasystematic stage, each proposition was analyzed to determine which propositions in the list, at the same stage or lower stages, were necessary to construct the higher order proposition. For example, a concept of fun is required to construct the abstract proposition, "A good education is one in which learning is fun/enjoyable/entertaining." Consequently, all respondents who employed this proposition were also given credit for the proposition, "A good education is fun."

Figure 3

Education as Play by Stage*

A good education... **Number of Occurrences by GSS Stage of Performance**

A good education...	Concrete	Abstract	Formal	Systematic	Metasystematic
includes play.	1	3	15	31	22
includes friends/friendship.	1	1	7	14	16
is one in which students have fun.	1	3	28	38	25
is one in which teachers are nice/caring/not too strict.		2	12	4	
is based on student likes/prefs.		1	13	19	5
is one in which people are nice/gets along.		2	16	14	15
includes learning through play.		1	9	25	22
includes playing games/doing projects/doing things.		2	9	23	22
requires interested/motivated/curious students.		1	6	14	11
is one in which students are encouraged to ask questions.			3	6	7
is one in which learning is fun/enjoyable/entertaining.			18	33	22
is one in which subjects/teachers are interesting.			17	29	22
stimulates curiosity/interest/desire to learn.			4	27	16
includes social interaction.			4	15	16
is one in which teachers are understanding/open/listen.			8	7	9
is stimulating/involving/engaging/inspiring.			1	12	13
includes active/experiential learning.			4	22	20
includes group activities.				4	9
supports learning for the sake of learning.				3	3
includes conversation/discussion.				3	8
is not frightening.					4
requires a dialectical engagement with learning process.					5
is one in which teaching involves constant testing.					3
is one in which testing is an opp. to show off learning.					1

*Explicit coding

Figure 3 shows the results of this analysis. Note that now there is only one empty cell to the right of the diagonal, the metasystematic level of "A good education is one in which teachers are nice/caring/not too strict." The grid has been filled in, indicating that there is, in fact, continuity of meaning across stages even though new constructions appear at each stage. However, we are left wondering, "How much continuity?" Is there enough to consider all of the propositions here as contributing to the same latent variable, the metaphor, education as play?

In order to pursue this question, the data from the second layer of the content analysis were submitted to a Rasch analysis. Each proposition was treated as an item, scored 1 for present and 0 for not present. The first time the analysis was run, all of the items were included. The item infit and outfit statistics (Wright & Masters, 1982) indicated that several of the items were not working with the other items to describe the same thread of meaning. These included, a good education... (a) is based on student likes/ preferences, (b) includes

friends/friendship, (c) is one in which teachers are nice/ caring/not too strict, (d) is one in which teachers are understanding/open/ listen, (e) requires interested/ motivated/curious/ students, (f) is one that stimulates curiosity/ interest/ desire to learn, (g) is not frightening, (h) is one in which people are nice/get along, and (i) supports learning for the sake of learning.

Recalling that the metaphor under investigation is education as play, it is not too difficult to see how these propositions, though they may partake of this metaphor, might include other meanings. Students, for example, may have educational preferences (a) that are unrelated to their experience of learning, such as those involved in the pursuit of a career choice. Moreover, though friends (b), may make education more fun, friends can be valued for other reasons, such as the social development of students. Similarly, nice or understanding teachers and schoolmates (c, d, & h) may make learning more pleasurable, but it is possible to value nice teachers or schoolmates for reasons unrelated to learning and playfulness, such as getting good grades. It is also interesting, but not too surprising, that propositions referring to the qualities of students (e, f) do not fit this particular construct. Education as play focuses on a quality of the learning experience, not the participants involved. Next, the negatively worded proposition, "A good education is not frightening," (g) is ambiguous. The relationship between fear and play or enjoyment is not clear. Finally, the failure of learning for the sake of learning (i) to work with the remaining items in the scale is more troubling than the failure of items a through h. The idea of learning for its own sake, on interpretive grounds, seems like a logical consequence of defining learning in terms of playfulness. Yet this proposition fit the model poorly. A closer examination of Figure 2 reveals that this proposition was explicitly present in only 5 of the interviews, and it only shows up in 6 interviews in Figure 3, after the addition of implicitly coded cases. It does not occur frequently enough (isn't popular enough) to register on the continuum being described by the other items.

The above propositions were eliminated from the final Rasch analysis because of their failure, on both statistical and interpretive grounds, to work with the remaining items to delineate the latent variable, education as play. Additionally, three unexpected responses to the proposition, "A good education includes social interaction," were set to missing in order to achieve a more valid estimate for that item (Wright, 1977). After their elimination, the proportion of the of the observed case estimate variance considered to be true (reliability of case estimates) was .88 (person separation = 2.98). (See Wright & Masters, 1982 for more

about reliability of case estimates.) The proportion of the observed item estimate variance considered to be true (reliability of item estimates) was .98 (item separation = 7.47). All remaining items (Table 2) have acceptable infit (information-weighted) and outfit (outlier-sensitive) statistics (Wright & Masters, 1982), indicating that they all belong on the same scale, or, in other words, that they delineate a single dimension of meaning. One proposition, "A good education is one in which testing is an opportunity to show off learning," that fit the model before misfitting items were deleted, disappeared from the analysis because the one performance that included it became a perfect case (scored 1 on every remaining proposition). The interview in question was, ironically, part of the original inspiration for exploring the metaphor, education as play. In this interview, play, in the form of a dialectic between teacher and learner, knowable and known, was a dominant theme.

As shown in Figure 4, the propositions order neatly by the order of hierarchical complexity of the performances in which they first appeared. On the left of the figure is the logit scale. This scale has interval properties (Wright, 1984). Relative distances between propositions (to the right of the logit scale) reflect their relative difficulties. In the present case, at least two factors appear to influence the relative difficulty of the propositions. One of these is order of hierarchical complexity, the other is the relative "popularity" of propositions within stages. Interestingly, their relative popularity does not confound the between-stage order of items, but it does have within-stage effects. "A good education is one in which students have fun," is significantly easier than "A good education includes play," because it was identified in more performances. One possible interpretation of this pattern is that informational, cultural, and situational factors have an impact on the content of particular propositions constructed at a given stage, but not on the order in which more global forms of thinking about a given construct emerge.

Figure 4

Education as Play*

99 PERSONS, 16 ITEMS, Reliability of item estimates = .97 (item separation = 7.47), Mean SE of item estimates = 2.2

	A good education is...	Categories of Description (by stage of performance in which propositions are first identified)
100	is one in which teaching involves constant testing requires a dialectical engagement with the learning process	**Metasystematic** The notion that good learning takes place in social interactions is coordinated with the idea that learning is discursive. Learning is viewed as a dialectical process in which teacher and student (or student and student) get caught up in the playful activity of learning. Testing—as a continuous spiral of feedback—is one way of conceptualizing this playful back-and-forth. This is dialectic defines the learning process.
90		
80		
70		**Systematic** Active participation in learning is coordinated with the idea of intellectual engagement can be increased through social interaction to produce the idea that good learning takes place in a discursive, participatory context. This is not the defining context for learning, but *is* the most enjoyable.
	includes conversation/discussion	
60	includes group activities	
50	is one in which students are encouraged to ask questions	**Formal:** Active engagment in learning is central to the learning process. The concept, interest, is differentiated into concepts like *involvement, engagement,* and *inspiration,* all of which point both to the absorbtion of the learner. Inspiration, stimulation, involvement, and engagement are generated by others (teachers). Social interaction is important insofar as it enhances engagement.
	is stimulating/involving/engaging includes social interaction	
40	includes active/experiential learning	
	includes playing games/doing fun things includes learning through play	**Abstract:** Knowledge acquisition is enhanced when students have fun. Interest motivates learning because it makes learning fun. Fun learning *is* interesting learning. Certain fun or playful activities are explicitly seen as educational. It is the teacher's job to make learning interesting.
30	is one in which subjects/teachers are interesting is one in which learning is fun	
	includes play	**Concrete:** A good school (for concrete children, education equals school) is one in which you get to play and have fun. The child does not connect concepts of fun and play to learning.
20	is one in which students have fun	

*Rasch difficulty estimates for propositions is based on both implicit & explicit presence of propositions in performances.

The proportion of the difficulty estimates for the propositions explained by the hierarchical complexity of performances is .46 after disattenuation for error (.25 before disattenuation for error) (Muchinsky, 1996; Schumacker, 1996). This means that, at best, the particular propositional content of performances explains almost half of the variance in stage. Could this new finding, at least in part, explain some of the contradictory evidence about the relevance of stages in the construction of meaning? (See Dawson, in preparation, for a discussion of relevant literature.)

The categories of description (this term was borrowed from Marton, 1983), shown on the right of Figure 4, are not intended as stage definitions. Instead, they are descriptions of the way in which conceptions at each level of hierarchical complexity integrate constructions available at the previous stage such that a single strand of meaning is preserved and

transformed across orders. These descriptions were constructed by examining the propositional content associated with each stage in light of the organizing principles of that stage and integrating the results into general descriptions of the concepts coordinated at each stage and the new meanings that result from these coordinations. This process was guided by the principles of task analysis described by Commons and his colleagues (Commons, Trudeau, Stein, Richards & Krause, in press).

Despite the moderate relationship between stage and conceptual content, new propositions occur at each order of hierarchical complexity. At the concrete level, two propositions are found that relate to education as play. These are that a good education: (1) is one in which students have fun, and (2) includes play. For children at this level, there is clearly some relationship between school (education equals school for this group) and fun or play, but it is coincidental. Kids want to have fun and play. Therefore they should be allowed to do so at school. The notion that play or fun and learning can go together does not emerge until the abstract stage. The propositions found at this stage include the assertions that a good education (3) is one in which learning is fun, (4) is one in which subjects/teachers are interesting, (5) includes learning through play, and (6) includes playing games/doing fun things. When notions of play or fun and learning are integrated, it is possible to assert that learning ought to be fun. Also, at this stage, the concept of interest is differentiated from the more general notion of having fun. Interest motivates learning by making it fun.

The propositions found at the formal order include the assertions that a good education (7) includes active/experiential learning, (8) includes social interaction, (9) is stimulating/involving/engaging, and (10) is one in which students are encouraged to ask questions. Student absorption into the activity of learning is the central theme at this stage. Interest is differentiated into stimulation, involvement, inspiration, and engagement. These are seen as things that can be given to the student by good teachers. They are not viewed as inherent in the learning process until the systematic order, which adds only two new propositions, that a good education (11) includes group activities, and (12) includes conversation/discussion. The notion that good education involves being absorbed into the process of learning is now coordinated with the idea that ideal education takes place in participatory contexts. These contexts are inherently playful, in that they involve interaction with peers.

At the metasystematic order, respondents take an additional step and coordinate the conceptualization that ideal learning takes place in social interactions with the idea that learning is inherently discursive, involving a continuous spiral of feedback. A good education (13) is one in which teaching involves constant testing, and (14) requires a dialectical engagement with the learning process. The inherent playfulness of this dialectic is embodied in the following assertion.

[The objects of learning] absorb each of the various partners in the dialogue into themselves as they play themselves out through those partners, recreating those involved to the extent that they lose themselves in the playful back-and-forth motion of the activity of the thing itself (respondent 125).

It is interesting that the word *play* is associated predominantly with constructions at the lowest and highest orders of hierarchical complexity. Apparently, shifts in meaning lead to changes in word preference, some of which can loop back upon themselves

Discussion

This multilayered, relational analysis of the interview data from a life-span sample reveals much about the interaction of hierarchical complexity and the construction of meaning. It has also opened new avenues of inquiry. First, the (playful!) instrumentally-mediated back-and-forth between theory-dominated and empirically-dominated methods of analysis lead to a clearer delineation of one metaphorical strand of meaning—education as play. Second, the distinction made between the hierarchical complexity of performances and particular conceptualizations demonstrate that their relationship is moderate, but not absolute. Both hierarchical complexity and other factors that contribute to the "popularity" of concepts influence their relative difficulty. Third, it was demonstrated that general descriptions of the new meanings—along a single metaphorical strand—that become available at successive orders of hierarchical complexity can sensibly be constructed by attending to the organizing principles of a given order in concert with the new propositions associated with that order.

I propose future studies that examine why, within stages, some propositions are more commonly found than others. Hierarchical complexity does not entirely explain the content of conceptions and consequently raises questions about stage-scoring methods that rely

heavily on content descriptions. However, the finding that almost half of the variance in proposition difficulty is explained by hierarchical complexity means that the cultural, informational, and situational factors that contribute to the construction of meaning can be more effectively investigated after accounting for hierarchical complexity.

The methodology employed in this project can also be employed to study the interrelationship of concepts within a domain as hierarchical complexity increases. To do this, it would be necessary to conduct analyses similar to the one presented here on other strands of meaning present in the data, and then look across the resulting sequences for propositions that contribute to the delineation of multiple strands.

Armon, C. (1984). Ideals of the good life: Evaluative reasoning in children and adults. Unpublished Doctoral dissertation, Harvard, Boston.

Commons, M. L., Richards, F. A., with Ruf, F. J., Armstrong-Roche, M., & Bretzius, S. (1983). A general model of stage theory. In M. Commons, F. A. Richards, & C. Armon (Eds.), Beyond Formal Operations, (pp. 120-140). New York: Praeger.

Commons, M. L., Straughn, J., Meaney, M., Johnstone, J., Weaver, J. H., Lichtenbaum, E., Sonnert, G., & Rodriquez, J. (1995, November). Measuring stage of development across domains: A universal scoring scheme. Paper presented at the Annual meeting of the Association for Moral Education.

Commons, M. L., Trudeau, E. J., Stein, S. A., Richards, S. A., & Krause, S. R. (in press). Hierarchical complexity of tasks show the existence of developmental stages. Developmental Review.

Dawson. (1997,). New tools, new insights: Kohlberg's moral reasoning stages revisited. Paper presented at the Twenty-Seventh Annual Symposium of the Jean Piaget Society, Santa Monica, CA.

Dawson, T. L. (1996, June). Rasch analysis of moral and evaluative reasoning across the life-span: An examination of stage transition. Paper presented at the 11th Annual Adult Development Symposium of the Society for Research in Adult Development, Boston, MA.

Dawson, T. L. (1998, June). A stage is a stage is a stage: An empirical look at a modern metaphor. Paper presented at the Annual Symposium of the Jean Piaget Society, Chicago.

Dawson, T. L. (in preparation). "A good education is…" A life-span investigation of developmental and conceptual features of

evaluative reasoning about education. , University of California at Berkeley, Berkeley, CA.

Gadamer, H.-G. (1989). Truth and method. New York: Continuum.

Lakoff, G. (1994). What is a conceptual system? In W. F. Overton & D. S. Palermo (Eds.), The nature and ontogenesis of meaning. The Jean Piaget symposium series., (pp. 41-90). Hillsdale, NJ: Lawrence Erlbaum.

Marton, F. (1983). Beyond individual differences. Educational Psychology, 3, 289-303.

Muchinsky, P. M. (1996). The correction for attenuation. Educational and Psychological Measurement, 56, 63-75.

Overton, W. (in press). Developmental psychology: Philosophy, concepts, and methodology. In W. Damon (Ed.), Handbook of Child Psychology, (5 ed.,). New York: Wiley.

Schumacker, R. E. (1996). Disattenuating correlation coefficients. Rasch Measurement Transactions, 10, 479.

Wright, B. D. (1977). Solving measurement problems with the Rasch model. Journal of Educational Measurement, 14, 97-116.

Wright, B. D. (1984). Additivity in psychological measurement. In E. E. Roskam (Ed.), Measurement and personality assessment, . Amsterdam: North-Holland.

Wright, B. D., & Masters, G. N. (1982). Rating scale analysis. Chicago: Mesa Press.