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A Logico-mathematic, Structural Methodology: Part I, The Analysis and Validation of Sub-literal ($S_{ub}L_{it}$) Language and Cognition

Robert E. Haskell

University of New England

In this first of three papers, a novel cognitive and psycho-linguistic non metric or non quantitative methodology developed for the analysis and validation of unconscious cognition and meaning in ostensibly literal verbal narratives is presented. Unconscious referents are reconceptualized as sub-literal ($S_{ub}L_{it}$) referents. An integrally systemic, structural, and internally consistent set of operations is delineated and instantiated. The method is related to aspects of two models. The first is logico-mathematic structure; the second is linguistic syntax. After initially framing the problem that the method addresses, along with some theoretical implications, historical precursors are briefly outlined. The method presents novel cognitive and linguistic operations. Though the method raises a number of issues of theory, research, and methodology, and makes a contribution to these areas, it stands independently, *qua method*.

This paper presents a systemic non metric methodology based on a set of novel and integrally consistent cognitive and psycho-linguistic operations for validating the analysis of what is commonly called unconscious meaning. Not only is apparent unconscious meaning recognized in clinical psychodynamic thinking but in everyday speech as exemplified in slips-of-the-tongue or double entendres, as well as in metaphorical and figurative language. Recognition of unconscious referents in spoken language has been of pervasive interest for centuries, at least in Western culture since the time of the ancient Greek philosophers, to Shakespeare, to present day. Essentially, the

I wish to thank Raymond Chester Russ for his many significant clarifying comments and extreme patience in editing this difficult manuscript. I also wish to express my appreciation to the many reviewers. Requests for reprints should be sent to Robert E. Haskell, Ph.D., Professor of Psychology, The New England Institute of Cognitive Science and Evolutionary Psychology, University of New England, Biddeford, Maine 04005. Email: haskellr@maine.rr.com

hypothesis has been that some literal words, phrases, topics, and stories in oral (and occasionally written) narratives reflect consciously unintended referents. As developed from a cognitive and linguistic framework unconscious meaning is more specifically conceptualized here as sub-literal ($S_{ub}L_{it}$) language (Haskell, 1983).¹ Despite the widespread perception of dual referents in verbal narratives, analysis and validation remain intuitive, if not serendipitous.

Two problems have been associated with $S_{ub}L_{it}$ findings. The first has been to base findings firmly within a cognitive science framework and not to relegate them to psychoanalytic theory, literary theory, and literary discourse. Haskell (1982, 1984) considers the $S_{ub}L_{it}$ findings presented here too significant cognitively to be relegated to these domains as is the tendency with material involving complex linguistic analysis and unconscious referents: consider, for instance, the long history of "metaphorical" and "analogical" (processes) which until the past few decades were viewed by cognitive science as simply "literary" devices. Analogical processes are now recognized as central to understanding cognition (Haskell, 1968a, 1987a, 1987b; Lakoff and Johnson, 1980; MacCormac, 1985).

The second problem has been not only to develop a method where none has existed, but to develop a method which includes complex "meaning" or semantics, not just an abstract syntactic formulation as historically is the case with linguistic analyses of classic speech-error research and slips-of-the-tongue (e.g., Baars, 1992; Fromkin, 1973; Norman, 1981). While $S_{ub}L_{it}$ language appears to utilize the linguistic mechanisms identified in the analysis of speech-error research, it demonstrates a class of "errors" and "slips" with an underlying intentionality or meaning. A method sensitive to unintended referents and to the psycho-linguistic nuances of language is needed. In this sense, then, the method is consonant with Whitehead's (1929) dictum that "*Every science must devise its own instruments*" (p. 16).

The fourfold purpose of this paper, then, is first and primarily, to present a novel methodology where none has existed; second, to promote research on that method; third, to stimulate cognitive science research on related issues that subserve the methodology; and fourth, to suggest that the findings issuing from the method may contribute to the knowledge base of psycholinguistic and cognitive theory.

The paper will proceed with a general introduction and overview, a brief review of antecedents or precursors of what is here termed unconscious or $S_{ub}L_{it}$ cognition. Two extended exemplifications will then be analyzed using the methodology. This was considered the most effective way to simultane-

¹As used by Haskell, the term "unconscious" is conceptualized as a "cognitive and emotional unconscious" (see e.g., Kilnstrom, 1984; Kihlstrom, Mulvaney, Tobias, and Tobias, 2000; Piaget, 1973; Reber, 1993). For ease of exposition, henceforth the term "unconscious" should be understood in this sense.

ously present both a broad array of operations and a more detailed application of the methodology. Due to the seemingly anomalous nature of this methodology and to the integrally systemic, complex interrelations and correlations of the cognitive and psycho-linguistic operations, however, the decision was also made to present in broad outline the total array of operations in an Appendix. To the extent that only a few operations are presented some operations may appear arbitrary. Also, the complete array is presented because claims of anomalous findings require substantial instantiation.

Preliminary Comments

Before delineating the method, a few further comments are in order. Because this methodology is anomalous, two following companion papers (Haskell, 2003, in press) will address some of the more significant methodological, epistemological, and theoretical issues undergirding the approach, as well as presenting corroborative findings for two significant cognitive operations ([10.] *Reversal, Inversion, Opposition Operations*, [12.] *Arithmetic Operations*).² A second paper addresses the necessity of a non experimental approach to psycho-linguistics and $S_{ub}L_{it}$ phenomena. While some of the less complex $S_{ub}L_{it}$ material presented is amenable to experimental design, it will be shown that a prior systemic methodology remains necessary for analyzing and validating the meaning of the material that an experimental approach is designed to manipulate. Hence the further need for a methodology independent of experimentation. Though discussed in the companion paper, it is nevertheless important to note at the onset that just as in mathematics where inferential procedures are conceptual and internally validated, given the logico-mathematic and structural character (henceforth, logico-mathematic) of the method, sampling procedures and statistical analyses are not directly relevant to validation.³ The third paper addresses theoretical issues.

A "cognitive operation" is typically defined as an internalized reversible action that can be carried out in thought and which is part of a larger and

²To facilitate ease of reading and to keep the analyses from becoming too lengthy, these italicized headings and similar ones cited throughout this paper that are technically part of the analyses can be found in the delineated Appendix.

³Linguistics did not develop its theories of syntax using experimental designs and statistical tests but was founded on structural, inferential, and lawful systems of relations. Such tests are only appropriate when attempting to show (or refute) that two factors are related. Sampling and other statistical methods do not apply where regularity or lawfulness is presumed to exist. With linguistic and verbal language (speech) lawfulness is assumed. The concept of speech parts and their combinations such as nouns, verbs, adverbs and so on, for example, is regarded as neither random nor merely probable but as lawful to language. Likewise, the concept of the *meaning* of a sentence constructed with the speech parts is not regarded as random or probable (from the point of view of the speaker) even though the sentence construction itself may

integral set of cognitive structures and processes. Arithmetic addition is such an example as is subtraction which is the reverse of addition; the same operation carried out in the opposite direction. One can be added to one and get two; then one can be subtracted from two to return to one gain.

In brief, the terms "structure" and "transformation" are used similarly to that of mathematical structure where cognitive and validation operations are constituted by an integral system of internally consistent isomorphic (i.e., one-to-one correspondence) relations of invariance.⁴ Accordingly, it should be emphasized that the logico-mathematic structure of the set of cognitive operations described necessitates reading as one would read a lengthy mathematical equation, with previous operations being "brought along" to each succeeding one. The term "structure" refers not to mathematic structure but to the linguistic, dimensional aspects of the method. In addition, the term psycho-linguistics (hyphenated) is more widely construed than in traditional psycholinguistics, reflecting a broader psychology of language.⁵

The term "unconscious" refers to cognition that is not consciously attended to or is out of subjects' attentional awareness — similar to masked priming effects where stimuli are presented either outside of one's focal attention, or are presented so rapidly that they can not be consciously perceived but which nevertheless influence subsequent behavioral responses (e.g., Murphy and Zajonc, 1993). Similar research on unconscious processing includes stimulus masking (e.g., Marcel, 1983a, 1983b), dichotically presented stimuli (Kimura, 1967), as well as the more controversial concept of subliminal stimuli (Dixon, 1981; Silverman and Weinberger, 1985), preattentive processing (Triesman, 1985), and the automatic activation of chronic goals and motives (see Bargh and Barndollar, 1995). Though social psychology, too, has been interested historically in the notion of unconscious processing, there seems to be increased interest under the concept of automaticity (see Niedenthal, 1990) of social cognition (see also Bargh and Chartrand, 1999). With the exception of refer-

show some variation. The point is that experimental/statistical methods are neither necessary nor sufficient for investigating the complex linguistic processes outlined here, just as they are not relevant in linguistics or in mathematics where inferential and logical procedures are the basis of validation (thanks to my colleague Anthony Badalamenti for further clarifying this issue in relation to my methodology).

⁴It should be noted that structure as discussed here bears no relation to the classic structural/functional approach of nineteenth century psychology, e.g., Titchener (1910).

⁵As Blumenthal (1975) put it, "The 'psycho-' has too often been left out of psycholinguistic" (p. 152). More specifically, Roger Brown (1958) suggested some time ago that "Psycholinguistics has never seemed to me to be a good name for the empirical study of language behavior . . . [T]he name appears to limit the field to the traditional objectives of linguistics and that is not desirable . . . Rather we aspire to a 'psychology of language'" (p. xii).

ring to historical issues and theoretical precursors pertaining to the concept of "unconscious," the term $S_{ub}L_{it}$ will be used.⁶

The concept "cognitive psycho-dynamic" is employed for explaining the underlying processes of unconscious material. Sub-literal findings clearly suggest an unconscious intentionality. In analyzing $S_{ub}L_{it}$ communications, two basic issues need to be clearly distinguished. The first is *how* unconscious thoughts and feelings are expressed. This entails the mechanics of the various $S_{ub}L_{it}$ cognitive operations presented in the methodology. The second, is *why* they are carried out. The term "cognitive psycho-dynamic" in this paper simply refers to unconscious cognition and has no relation to any therapeutic school or theory. This is pointed out because the term psycho-dynamic is typically identified with therapeutic theories of one sort or another. Cognitive psycho-dynamic, then, refers to conflicting unconscious thoughts, feelings and motivations that are inferred or hypothesized to be taking place unconsciously (however defined), and underlie the generation of $S_{ub}L_{it}$ material. As used here, the concept is closely aligned with automatic activation of chronic goals and motives as put forth by Bargh and Barndollar (1995). The term can also be seen as generally aligned with the competing plans hypothesis conceptualized by Baars (1992) to explain underlying motivations of slips-of-the-tongue.

Finally, there is a fundamental set of questions concerned with verbal narratives that remains virtually unasked and consequently unanswered: (1) Out of all the possible topics or stories in a verbal narrative, why is a particular topic or story introduced into a conversation? (2) Why out of all possible times or occasions or circumstances is a topic or story introduced into a conversation at a particular point in time? (3) Why out of the many stories selected-in to the conversation is one sustained and elaborated upon either by an individual or by others in a conversation? (4) Out of all possibilities, why is a particular wording, phrasing or syntax used? (5) Why does the content, structure, or plot of a topic or story match what is happening in the actual narrative situation? (6) Why is a topic or story repetitively transformed and permuted into variations of the initial topic or story? (7) And why are various internal linguistic structures and content of the story transformations and permutations all internally consistent and integrally parallel or analogous to each other as if there were a "generic" meaning that fits each story? Syntactic rule explanations describing which words can go together, in what order, and stochastic analyses of word frequency associations notwithstanding, the answers to these questions are necessary to understand how language and mind work. The present methodology represents an initial contribution toward answering this set of questions.

⁶The notion of unconscious processes existed, of course, in both philosophy and psychology long before Freud (Ellenberger, 1970; Whyte, 1978).

Introductory Overview

In linguistic situations where the concern of discussants is typically about an *authority figure*, increased literal references to *God, heads of state, police, parents* and other such figures appear in the verbal narratives. Such topics have sometimes been seen as metaphorical-like expressions of concern that speakers hold about authority figures in discourse situations. A $S_{ub}L_{it}$ narrative, then, is an apparently literal story, sentence, or phrase that exhibits dual and/or multiple referents.⁷ It should be noted that speakers are not aware of the dual semantic structure of their narratives. Such $S_{ub}L_{it}$ referents are primarily generated from affective schemata. This dual or $S_{ub}L_{it}$ meaning can in part be conceptualized as the consequence of the inherently deep structural ambiguity or richness of language leading to dual representations of sentences.⁸ In structural linguistics, for example, there are normal sentences whose surface structures have multiple deep structure or internal representations that generate the surface structure of so-called literal meanings. The following classic sentence from linguistics demonstrates multiple deep structure representations that underlie a single surface (read: literal) structure:⁹

A. *Surface structure*: The shooting of the hunters bothered him.

Representation 1: The killing of the hunters bothered him.

Representation 2: The sound of the hunters shooting their guns bothered him.

The internal representations of the surface structure for the above can be conceptualized as the structural and cognitive equivalent to the following $S_{ub}L_{it}$ representation of literal (surface structure) referents generated by phonetic type operations ([8.1.3.]*Phonetic Operations*).¹⁰

⁷The term narrative is used in two senses. The first refers to a verbal story, the second is used interchangeably with the more specific term "topic." There may be more than one topic in a story narrative.

⁸This paper will not address the problem of distinguishing between literal and figurative language. Recently, it has become clear in linguistics that this traditional distinction is untenable (see Ariel, 2002; Haskell, 2002, 2003). For purposes of this paper the term "literal meaning" should be understood as "conventional meaning," or "surface meaning." Only for convenience are both the terms literal and sub-literal used. Technically, the logico-mathematic method and $S_{ub}L_{it}$ findings do not assume the priority of the term literal. For more on this issue, see Haskell (in press).

⁹The concept of deep structure ambiguity has been adapted from Chomsky (1968) to refer to underlying cognitive representations of sentence surface structure.

¹⁰Numbered headings presented with brackets are from the Appendix where they are instantiated.

B. *Surface structure*: It's working to a degree.

Representation 1: It's working to a certain extent.

($S_{ub}L_{it}$)

Representation 2: It's working to/ward/ a [college] degree.

Again, the linguistic and cognitive question that needs to be answered is why was the particular phrasing of *Surface structure B* selected? Applied to sub-literal reference, in *Representation 1* the literal reference was that something was *working to a certain extent*. *Representation 2* is generated from an underlying affective schema about the laboratory course from which this example occurred, i.e., it was a requirement for group discussants earning a college degree. Contextually, the dislike of having to take and be part of such a course had been discussed. As indicated above, there were many other phrasings that could have been used; for example, in the first representation it could have been said, "*It's working to a certain extent*" or "*It's working somewhat*," or "*It's not working as well as it should*," or a host of other phrases, but these phrases would not have served to express the unconscious concern.

The methodology presented here, along with its theoretical bases, has been in development for many years (Haskell, 1978, 1982, 1983, 1984, 1985, 1986, 1987a, 1987b, 1987c, 1989, 1990–1991, 1991, 1999a, 1999b, 2000, 2001, 2002; Haskell and Badalamenti, 2003).¹¹ It will be seen that the method is atypical to any past or current psychological or linguistic methodologies. Moreover, the methodology raises a number of well-known, theoretically significant and controversial issues in numerous historical and contemporary research areas, including unconscious processing in general (e.g., Greenwald, 1992), unconscious intentionality and meaning in so-called slip-of-the-tongue phenomena in specific (e.g., Baars, 1992), the neurological substrates subserving unconscious programs (e.g., Shevrin, Bond, Brakel, Hertel, and Williams, 1996), and the long-standing problem of distinguishing literal from figurative language (e.g., Giora, 1997; Pollio, Smith, and Pollio, 1990), as well as the relation of cognition, phonology, and mental "representations" of grammar (Jackendoff, 1996; Langacker, 1987).¹² As presented, however, the

¹¹This paper supercedes partial versions previously published.

¹²Just as "metaphor" has been a problem for contemporary linguistic theory (–ies, except as idioms), $S_{ub}L_{it}$ findings are even more problematic. As I was completing this paper I became aware of Jackendoff's (2002) seminal reconstruction of linguistic theory. Even more than Langacker's (1987) cognitive grammar approach to linguistic processes, $S_{ub}L_{it}$ findings seem to be more compatible and consistent with Jackendoff's framework. He not only bridges the traditional "modular" barriers between syntax, phonology, and semantics but he connects a "theoretical linguistics" with everyday language by incorporating the hoary problems of "meaning" and context, all within a clearly psychological and neuroscience perspective. Jackendoff's reconstruction of linguistic processes render some of the more seemingly anomalous linguistic operations demonstrated in this methodology more explainable (see in particular, Jackendoff, 2002, pp. 202–230).

methodology need not address these issues. Although it presupposes a stance toward many of these attendant issues, the method stands independently of them.

The analysis and structure of verbal narratives has long been an interest in cognitive psychology (e.g., Thorndyke, 1977). More recently, Bruner (1990) observed that "One of the most ubiquitous and powerful discourse forms in human communication is *narrative*" (p. 77). The data for the methodology were gathered in a small group dynamics laboratory. Historically, however, research in small group dynamics has not been utilized as a source of linguistic and cognitive findings. Accordingly, the primary significance of this paper lies not in small group behavior, nor in understanding narrative. While verbal narrative is the vehicle of expression, this paper is about $S_{ub}L_{it}$ processing of language and meaning, and about psycho-linguistics and cognitive processes.

Historical Antecedents and Precursors of $S_{ub}L_{it}$ Linguistic Referents

The analysis of unconscious or unintended meaning has its origins in everyday language; its initial conceptual roots, however, lay in a sporadic array of primitive precursors from clinical psychodynamics (e.g., Freud, 1960), and as metaphorical-like language within a psychoanalytic framework (e.g., Marshall, 1999) as well as within a psychodynamic psychotherapy where metaphors in patient narratives are analyzed (Fine, Pollio, and Simpkinson, 1973). Derived from these contexts, various historical approaches in small group dynamics research has conceptualized unconscious meaning in narratives as "fantasy theme analysis," for example, the classic work of the social psychologist Bales (1970; Bales and Cohen, 1979) and his associates issuing out of the Harvard Social Relations 120 Small Group Laboratory course in the early 1960s, as group metaphor (e.g., Morocco, 1979), and various other conceptualizations (see Dunphy, 1968; Gibbard and Hartman, 1973; Mann, 1967; Mills, 1964; Schutz, 1971; Slater, 1966). In addition, in parallel with small group dynamics there exists a group psychotherapy and individual psychodynamic literature (Durkin, 1964; Ezriel, 1956; Foulkes and Anthony, 1957; Goldberg, 1970; Langs, 1985; Mullahy, 1970; Smith, 1991; Whitaker and Lieberman, 1964; Yalom, 1970) where what is here referred to as $S_{ub}L_{it}$ phenomena has been sporadically observed (see Haskell, 1999a). Depending on the theoretical framework of the researcher, unconscious language has been termed *latent communication*, *symbolic equivalencies*, *collective projection*, *parataxic distortion*, *analogic communication*, *derivatives*, as well as various other labels. When such stories or topics are thought to carry unconscious reference, they are seen as simple unconscious metaphors, analogies or double entendres expressing concerns a speaker has about a discourse situation.

To varying degrees, then, such phenomena have been recognized within psychoanalytic theory and other domains — not within cognitive and linguistic frameworks. In addition, with the exception of Bales' (1970) classic work in social psychology which devoted a chapter on guidelines for recognizing what he called "fantasy themes," there has been neither systematic theory nor methodology for recognizing, analyzing, and validating $S_{ub}L_{it}$ type phenomena. The lack of systematic recognition and method leaves such "interpretive" meanings open to clear criticism as to whether unconscious meaning, in fact, exists.

Method and Procedures

Data for the following analysis were gathered in a small group dynamics laboratory, where ten to 15 discussants engaged in unstructured and spontaneous discussion. The situation was similar to the classic T-group setting (see Bradford, Gibb, and Benne, 1964). While $S_{ub}L_{it}$ narratives occur in everyday discourse situations, the advantage of the small group laboratory is that more systematic data recording and tracking are possible.

Two extended exemplifications of the methodology will be presented in the following section. The complete array of cognitive and linguistic operations from a variety of groups is presented in attenuated form in the Appendix. The first extended exemplification is based on two operations: phonetic and syntactic. The second extended exemplification, from a different group, is based upon numeric operations from a transcribed protocol of a tape recording of an eighty-minute narrative session.¹³ The protocol was then subjected to the controlling methodology here delineated (see Appendix). *Working from a protocol made it possible to systematically account for each numeric reference mentioned during the session and virtually eliminated bias in selecting only certain numeric topics to illustrate a specific sub-literal referent.*

The exact numeric composition of a group is contextually important for analyzing $S_{ub}L_{it}$ referents, especially for numeric referents. The second extended exemplification is from a group composed of 15 discussants, of which 12 were present. Discussants included 1 male, very active; 11 females, of which 1 was an older woman who was quite active, with 10 of the females ranging 18–20 years old. Of the younger females, 5 were active, or 6 if the older female is included. Total discussants, including the male member that was active equaled 7, or 8 counting the researcher/trainer. There were 2 males counting the researcher/trainer; 2 dominant leaders, a male and an older female, 3 counting the significant role of the researcher/trainer. The total

¹³A transcribed protocol of this eighty-minute session is available for research purposes upon request.

membership during the session was 12, or 13 counting the researcher/trainer. Most discussants were relative strangers to each other.

Except for the structure of the setting, the researcher/trainer role is non directive, contributing only strategic and analytical interventions. Typically, the researcher/trainer does not interact, but observes and takes notes. Sessions were eighty minutes in length; an audio tape recorder was in view, as was a "one-way" mirror. It is well-known that the non directive mode of a T-group generates conditions of (a) low social structure, (b) high ambiguity, (c) uncertainty, (d) interpersonal conflict evolving around personal or social taboos or etiquette, (e) free-floating discussion, (f) uncomfortable pauses and silences, and (g) affective or emotional arousal. In turn, as the analyses here will show, these conditions create an optimal cognitive state in which unconscious affective and linguistic schemata are activated. The hypothesis is that literal narrative topics and their variations are generated from and correspond to the affective schemata of discussants about the dynamics in the narrative situation. How context and group history are integral to analyses will become increasingly clear.

It is important to note that repeated interviews of discussants outside of the narrative setting to ascertain if discussants were aware of the dual referents of their narrative often invokes surprise, laughter, and incredulity. Only rarely does the dual referent evolve to a semi-aware state. When it does occur, it seems to be associated with linguistic shifts ([9.1.] *Temporal Shift Operations*).¹⁴ It is also important to point out that the $S_{ub}L_{it}$ findings presented have repeatedly and consistently been found across multiple narrative protocols involving a range of membership demographics. Finally, analysis of a protocol produced from spoken narratives must be approached as oral speech, not as formalized written language. The distinction between "speech," on the one hand, and formalized, written, grammatically correct linguistic productions, on the other, is an important distinction that holds cognitive implications (see Chernigovskaya, 1994; Chiarello and Church; 1986; Haskell, 2002; Ong, 1982). In analyzing oral speech, "errors," speech sounds, inflections, pauses, and memory distortions are important factors.

Two Systemic and Extended Exemplifications of the Methodology

This section presents two extended $S_{ub}L_{it}$ exemplifications. The first is primarily based on the semantic analysis of phonetic and syntactic structures, the second on the analysis of numeric references.

¹⁴When linguistic labels and concepts are noted here, e.g., [9.2.] *Noun Shift Operations*, they are to be understood as just conventions used for explanatory purposes, not as real "shifts" that occur in cognitive and conceptual structures; it is unlikely that the cognitive/brain apparatuses generating language recognize such explanatory models or distinctions.

First Extended Exemplification: Phonetic and Syntactic Structure

This first extended exemplification of $S_{ub}L_{it}$ meaning is based on two basic cognitive operations derived from a narrative about a journalist ([8.1.3.] *Phonetic Operations*, [8.2.] *Syntactic Ordering Operations*). These two operations are integral to a single narrative and therefore the analysis will be instantiated as one.

Phonetic Operations. Narratives often generate $S_{ub}L_{it}$ referents by phonetic transformations similar to punning, double entendres, and other plays on words. This is indicated by the name /*Harry Harris*/ which was mentioned as the name of a well-known journalist.¹⁵ Contextually, the group discussion was in its initial stages of development ([2.] *Contextual Procedures*, [2.2.] *Developmental Stage*). The primary affective schema was about 2 researchers/trainers who were writing notes on the group dynamics. /*Harry Harris*/ is a sub-literal reference describing the 2 *researchers/trainers*. The first name /*Harry*/ is a phonetic transformation for *hair*y, which describes the researcher/trainer who has a *beard*. The last name /*Harris*/ is a phonetic transformation for *hair*less which describes the researcher/trainer who was *beardless* (see Figure 1).

Syntactic Ordering Operations. These refer to grammatical relationships in which words used homophonically as $S_{ub}L_{it}$ references are sequentially ordered in such a manner as to isomorphically correspond to their actual status order ([1.2.] *Isomorphic Mapping Operations*). This is indicated, first, by the name /*Harry Harris*/ which was generated to correspond sub-literally to the correct *seniority* or *status order* of the 2 *researchers/trainers*. That is, the first name /*Harry*/ and its phonetic transformation *hair*y represent not only the bearded researcher/trainer but the fact the he is the *senior researcher/trainer*.

Second, the last name /*Harris*/ and its phonetic transformation *hair*less represent not only that the other researcher/trainer is *beardless* but the fact that he is the *junior researcher/trainer*. Third, corresponding to the same kind of syntactic order, it is significant that the double Hs in the name /*Harry Harris*/ correspond to the first letter in the last names of both *researchers/trainers*. Fourth, in the same narrative, the sub-literal syntactically-expressed status order is further indicted in a transformation narrative ([3.1.] *Transformational Operations*) involving 2 newspapers, both names of which began with the letter *H* just as the 2 *researcher's/trainer's* names begin with the letter *H*: the first is the /*Harrisburg Independent Press*/ (*HIP*) which was known as a "liberal" newspaper, and the second, the /*Harrisburg Patriot News*/ was regarded as the more conservative daily. Fifth, the first and liberal newspaper is a sub-

¹⁵Henceforth, the text enclosed in slashes /thusly/ indicates the exact language used by discussants.

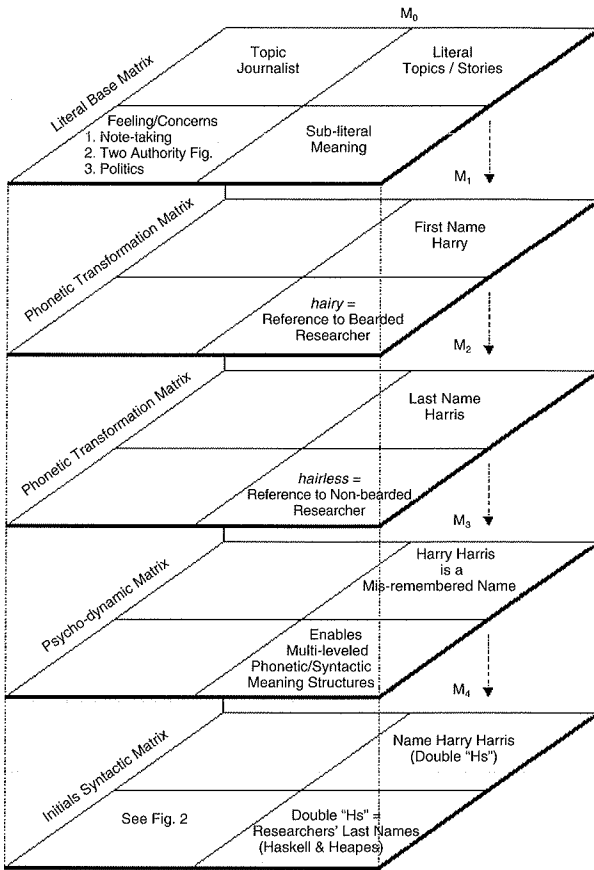


Figure 1: Phonetic transformation lattice matrix.

literal reference to the *senior* and bearded researcher/trainer as partially indicated by the acronym */HIP/* which in the vernacular means to be “with it” or “*avant garde*” and by the adjective */Independent/* (this newspaper was in fact frequently referred to by its acronym).

Sixth, the second newspaper, the */Harrisburg Patriot News/* was a sub-literal reference to the *junior*, non bearded, researcher/trainer who by comparison was perceived as the more conservative (= a patriot). Seventh, and significant in terms of validity, is that the reference to the journalist */Harry Harris/* was in fact a *mis-remembered* name. The discussant later reported that the intended name was *Sidney Harris*, a well-known columnist at the time. This is a cognitive psycho-dynamic “mistake” allowing the above series of sub-literal referents to be expressed. Without this memory reconstruction it would not have been possible to express the concerns about the 2 researchers/train-

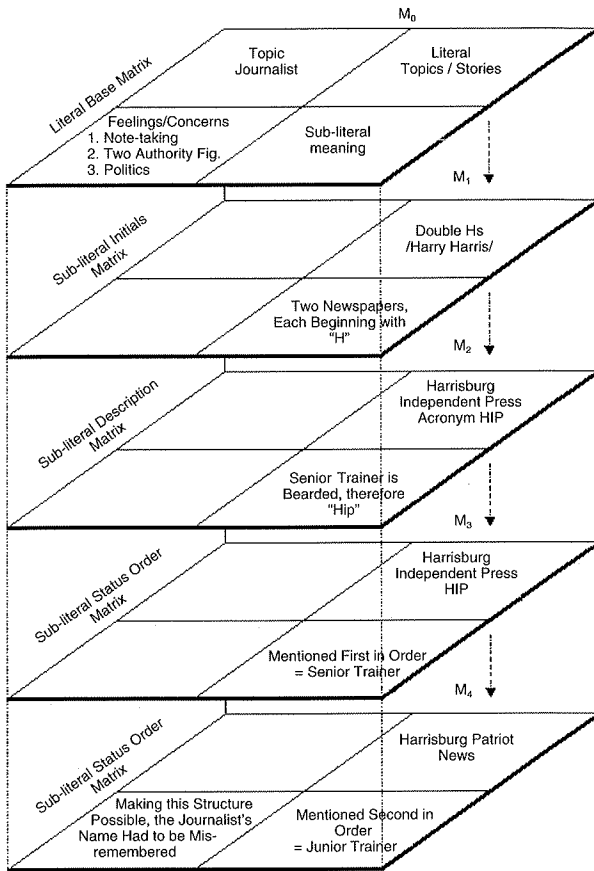


Figure 2: Syntactic order lattice matrix.

ers in this structurally integrated manner ([11.1.] *Memorial and Perceptual Reconstruction Operations*).

In addition to more general operations like matching and mapping, the above set of $S_{ub}L_{it}$ referents utilized the following linguistic operations: [8.1.] *Homophonic Operations*, [8.1.2.] *Oronymic Operations*. The above set of sub-literal referents is further supported (see Figure 2) by the consistent and extended set of nominal and structural operations: [7.1.] *Names*, [7.2.] *Initials*, [14.] *Matrix and Lattice Structure Validation Operations*, and [15.] *Multi-correlative Transformational Validation Operations*.

The above literal narrative was constructed to select a name and other story components to correspond to and describe (a) the physical characteristics of the 2 researchers/trainers, (b) both their first and last names, and at the same time (c) express unconscious affective schemata about them. (This

is a cognitive feat typically seen only in the structure of a great poem, see Haskell, 1987c.) The structural integration demonstrated by these two extended exemplifications likely indicates a cognitive mechanism for memory storage and retrieval efficiency.

Finally, just as in the next extended exemplification, in order for this series of consistent and structurally integral topics to occur, with each representation (i.e., status, seniority, physical description) and corresponding referent across the various transformations all topics must somehow be cognitively (a) mapped, (b) tracked, and (c) stacked systemically throughout multiple levels of meaning and through various story permutations, all remaining invariant with respect to the specific set characteristics (e.g., numeric magnitude, age, gender, etc.) and meanings ([14.] *Matrix and Lattice Structure Validation Operations*, [15.] *Multicorrelative Transformational Validation Operations*). Neither these structures, nor the more extensive structures to be demonstrated below can be explained as chance or coincidence.

Second Extended Exemplification: Parsing and Validating the Triadic Structure of a Single Numeric Narrative Series

The second extended exemplification of $S_{ub}L_{it}$ meaning is based on two major categories of cognitive processes briefly delineated in the Appendix ([12.] *Arithmetic Operations*, [13.] *Logico-mathematic Representation Operations*) involving numeric operations. Just as words function sub-literally, so can numbers in narratives (see Haskell, 1983). Counterintuitively, using numbers in narratives to illustrate this method may be seen as adding needless controversy. They are used, however, because unlike analyzing the meaning of words, numbers found in topics are relatively bounded and concrete and, thus, can more clearly and succinctly be mapped on to the membership composition of the narrative situation and tracked throughout the narrative to demonstrate the transformational and logical structure of the method ([12.] *Arithmetic Operations*). Initially, in terms of the veridicality of this numeric series, Haskell and Badalamenti (2003) have recently demonstrated what Haskell had suspected for some time: that the series of $S_{ub}L_{it}$ numeric topics exhibit an algebraic structure.

The following fourteen numeric topics containing the number "3" are from a larger set of narratives that occurred in a single session.¹⁶ The topic titles are verbatim from the actual language used in the narratives (and hence, as titles, will be capitalized). These topics were: (1) /3 Lucky Spots/ (2) /3 Different Options/ (3) /3 Weeks Ago/ (4) /3 Hours Before/ (5) /The 3rd Stream/ (6) /3

¹⁶Because it is easier to follow visually, the analysis of numbers is presented as numerals and not in typical orthographic style.

Drinks/ (7) /On the 3rd Day/ (8) /3 Seniors/ (9) /3 Old Greyhound Buses/ (10) /This 1 Girl Who Was With 2 Guys/ (11) /Under 21 Years of Age/ (12) /John Smith, 21 Years Old/ (13) /2 or 3 Weeks/ (14) /3 of the 10 People/.¹⁷

The affective schemata of the discussants about the 3 *dominant members*, composed of (a) an older woman, (b) a slightly older male, and (c) a researcher/trainer. These 3 discussants constituted the dominant subgroup, with the remaining membership constituted by 10 young females. The complete series of fourteen topics constitutes a general inclusive set or group expressing a basic $S_{ub}L_{it}$ affective schema about the 3 *dominant discussants* as each narrative involves a representation containing the number 3 in some form.¹⁸

The general set of fourteen topics is then further divided into two subsets, *transformations* and *permutations* of that general schema. The first six topics appear to be simple transformations of the basic affective schema about the 3 *dominant discussants*. Transformations are single-level repetitions of this schema with each transformation repeating the basic schema. *Permutations*, as indicated by topics 7–14, are complex differentiations of specific aspects or elements of the basic affective schema. In this case, the sub-literal schemata express differentiations *within* the 3 *dominant discussants* subgroup. Categorized by these two operations, the topics are outlined in the following figure (see Figure 3).

Topics 7–14 are subsets with one set expressed in a semantic mode, the other in a numeric mode. Topics 7–9 constitute permutations semantically expressed. Topic number 7 about a bar called the */3 Lucky Spots/* reflects an affective schema with *position status* of the 3 *dominant discussants*, as indicated by the vernacular phrase */Lucky Spots/*. Topics 8 and 9 about */3 Seniors/* and */3 Old Greyhound Buses/* express an affective schema about *age status* (i.e., the 3 *dominant discussants* were older than the rest of the discussants). This concern is indicated by the terms */Seniors/* and */Old/* in the topics.

The second set of permutations, topics 10–13, is constituted by numeric representation of the gender composition of the 3 *dominant discussants* (i.e., 1 female and 2 males). For example, the topic of */This 1 Girl Who was With 2 Guys/* is a sub-literal reference to the exact numeric and gender composition of the 3 *dominant members* subgroup. In the topic of being */Under 21 Years of Age/* the number 2 in the reference to */21/* years old, again, represents the 2 *males*, with the */1/* representing the 1 *older woman*. Thus, in sub-literal operations the */21/* actually represents two separate numbers that are then added

¹⁷Throughout, the verbatim titles of topics will be indicated by slashes with the first letter of each word capitalized.

¹⁸It is significant to note that repeated occurrences, for example, of the number 5 in a narrative where only 5 people are active will change to 4 if one of the discussants leaves or is otherwise absent. Moreover, these literal numbers in narratives and their changes are consistent across different sessions of the same discussion group.

Transformations and Permutations of an Affective Schema

- (1) 3 Different Options
- (2) 3 Weeks Ago
- (3) 3 Hours Before
- (4) The 3rd Stream
- (5) 3 Drinks
- (6) On the 3rd Day

*Permutations of the General Affective Schema**Semantic: Status and Age Attributions*

- (7) 3 Lucky Spots Bar
- (8) 3 Seniors
- (9) 3 Old Greyhound Buses

*Numeric**Gender and Age Attributions*

- (10) This 1 Girl Who Was With 2 Guys
- (11) Under 21 Years of Age
- (12) John Smith, 21 Years Old

Part/Whole Attributions

- (13) 2 or 3 Weeks
- (14) 3 of the 10 People

Figure 3: Narrative transformations and permutations.

together, i.e., $2 + 1 = 3$. Similarly, topic 12 about a hypothetical */John Smith, 21 Years Old/* represents a concern with the age differential.

It is significant that the topic */John Smith, 21 Years Old/* was generated by the male member of the 3 dominant discussants who was older and either was or was nearing *21 years old*. The topic is again a numeric representation of the 3 dominant discussants, i.e., $2 + 1 = 3$. Note that this topic — generated by one of the male discussants of the triad — was not semantically linked with the preposition */Under/* which indicated social hierarchy as was the case in topic 11. Thus, the references are psycho-sociometrically congruent with each other (for the methodological significance of this, see [4.] *Psycho-sociometric Operations*). Topic 13 */2 or 3 Weeks/* expresses an affective schema about 2 of the dominant discussants in relation to the total subgroup of 3 ([12.] *Arithmetic Operations*, [13.] *Logico-mathematic Representation Operations*).

The third set of permutations exemplified by topic 14 */3 of the 10 People/* expresses an affective schema about a part/whole relationship. The */3 of the 10 People/* topic concerns the relationship of the 3 dominant discussants to the rest of the group as indicated by the number */10/* which represents the remaining 10 discussants.¹⁹

¹⁹It should be pointed out that it is possible that some of these transformations are really permutations. This would not, however, change the topics exhibiting set or mathematical properties; it would change only the content of sets or groups.

Because the numeric topics involving 3s are integrally connected to other numeric topics reflecting additional factions within the protocol, this permutation is an access topic into other topics which can not be presented here and will not be further examined. It is mentioned to point out that there are additional related numeric topics within the protocol that reflect the integral relation of the 14 topics analyzed (see Figures 4 and 5).²⁰

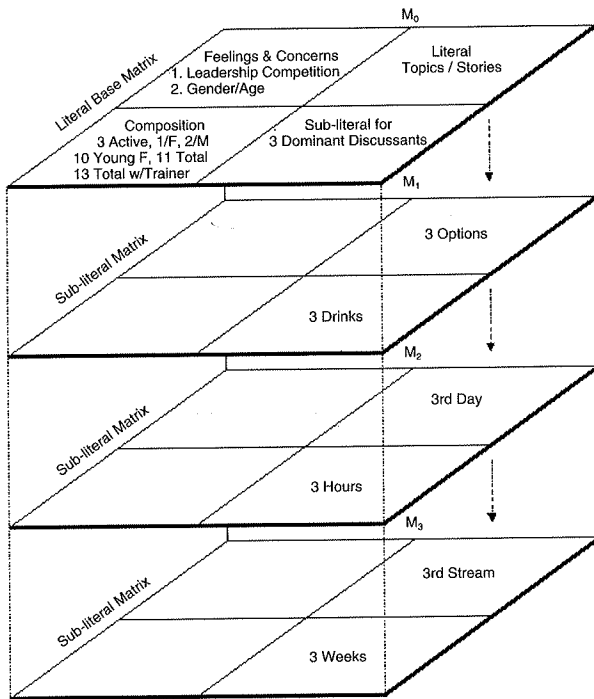


Figure 4: Topic transformation lattice matrix.

²⁰The topics and their mappings can be stated analogically as follows:

The topic of *3 Lucky Spots* : the 3 dominant members' *actual status position* in the group
 :: the topic of *This 1 Girl Who Was With 2 Guys* : the *actual gender composition* of the 3
 dominant members subgroup :: the topic of *3 seniors* and *3 old greyhound buses* : the
actual older ages of the 3 dominant members, etc.

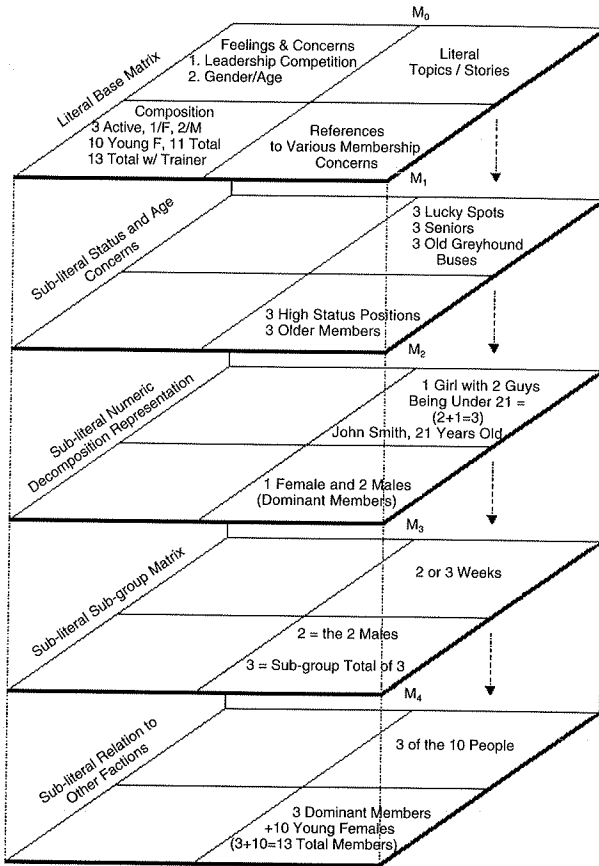


Figure 5: Topic permutation lattice matrix.

Summary Validation Analysis of the Numeric Narrative Series

This section will continue with a more detailed examination on the series of narratives containing the number 3 which are hypothesized to be $S_{ub}L_{it}$ topics about the 3 dominant discussants and will outline twenty-five (a) *Structural Consistencies*, (b) *Linguistic Consistencies*, and (c) *Associative Consistencies* that are integral to the above numeric narrative series. These three categories, however, are not necessarily mutually exclusive. A single topic may exemplify more than one of these categories. It is these consistencies found within this series of topics which must be explained; they are not explainable from a literal perspective.

Structural Consistencies. Structural aspects of the $S_{ub}L_{it}$ topics refer to the identical features of the topics with the actual membership structure in the con-

versation. The first four structural consistencies presented below are straightforward, requiring no "analysis" to map them to actual narrative situations.

1. All 14 narratives contained the number /3/ in one form or another.
2. All 14 narratives were found to structurally correspond to the triadic leadership in the actual situation of 3 discussants dominating the group dynamic ([1.1.] *Matching Operations*, [1.2.] *Isomorphic Mapping Operations*).
3. With the exception of topics 1, 5, 7, and 12 which are different contextually, the remaining 11 topics were generated by discussants who had affective schemata concerning the triadic leadership structure ([4.1.] *Resonance Operations*, [4.2.] *Sociometric Operations*).
4. The actual structure of the triad was broken down into its correct sub-literal sub-numeric components. For example, in topic 10 /*This 1 Girl Who Was With 2 Guys*/ equates to the 1 female and 2 male leaders, hence, $1+2=3$. Similarly, numeric topic 11 /*Under 21 Years of Age*/ by an addition operation of the /2/ and the /1/ also equates to $2+1=3$, as does topic 12 /*John Smith, 21 Years Old*/ i.e., $2+1=3$ ([12.1.] *Numeric Representation Operations*).
5. The numeric structure of the topic was specifically broken down into its correct sub-literal gender components e.g., in topic 10 /*This 1 Girl Who Was With 2 Guys*/ ([4.3.] *Gender Reference Operations*).
6. The composition of the actual triadic structure was sub-literally, and correctly, differentiated by age difference from the rest of the group by the term /*Seniors*/ in topic 8 about /3 *Seniors*/ and by the term /*Old*/ being associated with the /3 *Old Greyhound Buses*/ in topic 9, and in topic 12 by /*John Smith, 21 Years Old*/ ([4.4.] *Age Reference Operations*).
7. Adding the numbers in the topic /3 of the 10 People/ i.e., $3+10$, totals to 13, the exact membership of the group in that session (see just below for this computational operation).
8. The triadic structure was correctly delineated from the rest of the 10 young females in topic 7, about /3 of the 10 People/ who came into a bar. On a literal level, the number /3/ is included within a total number of /10/ but in sub-literal terms they are separate, thus adding to 13. The arithmetic structure of the number /3/ being included as part of the number /10/ would not have fit the total group membership. For example, to have said "3 people came in and sat down with the other 7 people at the bar," would (con)textually have precluded adding the numbers to total to the 13 discussants (see [12.] *Arithmetic Operations*, [13.] *Logico-mathematic Representation Operations*).
9. The triadic structure was further broken down into its components. For example, in Topic 6, the reference to the liquor control board men who were said to be coming /*Like in 2 or 3 Weeks*/ the /2/ corresponds to the

2 males, and the /3/ references the total triadic structure (see again [12.] *Arithmetic Operations*, [13.] *Logico-mathematic Representation Operations*).

10. The remaining membership of the group was correctly differentiated from the triadic structure by the literal description of the people in the bar with */Over Half of Them Were Under Age/* ([4.4.] *Age Reference Operations*).

Linguistic Consistencies. Linguistic aspects of the $S_{ub}L_{it}$ topics refer to the specific use of semantics, phonology, and syntax that each individual topic, as well as the topics collectively, consistently exhibit.

11. Linguistically, consistent conjugations of pronouns are used to connect a topic with its sub-literal referent. This is done by tense shifts. For example, the pronoun */This/* in the statement */This 1 Girl Who Was With 2 Guys/* is used instead of lexically selecting “that” girl or “the” girl or “a” girl who was with 2 guys. This shift links psychologically the literal narrative to the actual narrative situation ([9.1.] *Temporal Shift Operations*). As to why the older woman was referenced with the noun */Girl/* especially since in narratives 8 and 9 the references to */Seniors/* and */Old/* correctly indicated the older age of the woman, based on other protocols it appears that literal terms are often used generically on the sub-literal level. That is, nouns like */Girl/* are used simply as a gender reference, not as a specific reference to youth ([4.4.] *Age Reference Operations*, [4.5.] *Generic Operations*). The context surrounding a generic reference will typically indicate how the term is being utilized.
12. Linguistically, consistent conjugations of pronouns are used to sub-literally link narratives to the actual group situation. For example, the story about */We Narrowed Them All Down to 3 Different Options/* is a reference to the 3 dominant discussants who narrowed the leadership to themselves. The story was generated by a member of the triad. For discussants who were not part of this dominant triad to have introduced this topic with the particular wording */We/Narrowed Them Down/* would not have been congruent with what occurred in the actual narrative situation because the larger group did not narrow the leadership down to 3 people — the triad did. That topics 1, 5, 7, and 12 were generated by a member of the triad with all other topics being presented by the rest of the younger females is psycho-sociometrically consistent with the triad’s affective schemata. These consistencies are methodologically important and are referred to as psycho-sociometric validity ([4.] *Psycho-sociometric Operations*).
13. Nouns are consistently used as adjectives and adverbs to sub-literally link narratives to the actual group situation. For example, the narrative about */3 Seniors/* (meaning high school seniors) used literally as a noun, was used sub-literally as both a noun and an adjective to describe

the older discussants of the triadic leadership structure ([4.] *Psychosociometric Operations*, [9.2.] *Noun Shift Operations*).

14. Prepositions are consistently shifted to their adjectival or adverbial form to link sub-literal narratives to the actual narrative situation, as in the statement being */Under 21/* referring to not being 21 years old but to being */Under/ 21* years old, i.e., being */Under/* the authority of the triadic leadership structure i.e., $|21| = 2+1=3$ ([5.2.] *Dimensional Evaluative Vector Operations*, [5.3.] *Dimensional Vector Equivalence Operations*, [9.5.] *Prepositional Shift Operations*).²¹

Associative Consistencies. Associative aspects of the $S_{ub}L_{it}$ topics refer to the related aspects of each individual topic as well as the topics collectively being associatively consistent.

15. Most of the narratives containing the number */3/* are not just isolated 3s; they are included in or associated with narratives about a larger group-like unit, as in musical rock groups, bars, airplanes, and buses, just as the members of the triad are part of a larger group ([13.5.] *Inclusivity and Exclusivity of Categorical Set Operations*).
16. Semantic associations correspond to the actual *social status* of the triad, as in the phrase */3 Lucky Spots/* found in topic 7 ([5.1.] *Semantic Association Operations*).
17. That the topic */The 3rd Stream/* is perhaps a sub-literal reference to the slightly older, extremely verbal male is indicated by being congruent associatively with the language community vernacular, meaning someone talking a “steady stream.” This is in turn congruent with other narratives about people who talk too much ([5.1.] *Semantic Association Operations*, [9.7.] *Vernacular Operations*).
18. In the topic */It Started Snowing 3 Hours/* before the plane arrived at the airport, it needs to be asked again, why both the sub-topic of */snow/* and the number */3/* were associated? In terms of contextual information adding to the validity of this analysis is the fact that during the first meeting (the only instructional lecture) the researcher/trainer had *overloaded* participants with a sort of crash course on group dynamics. That is, in common vernacular, he “snowed” them with his lecture. So this particular sub-topic about snow is probably a specific sub-literal reference to the researcher/trainer and/or to the fact that the group situation was confusing. Other associated topics were part of this conversation. For example, it was said that the snow caused */Air Traffic Problems/* so that passengers were */Flying Around in Circles/* waiting to land. The */Air Traffic Problems/* is likely — and typically — a sub-literal

²¹Prepositional phrases are composed of a preposition and its object, which often have adjectival or adverbial properties, see [9.5.] *Prepositional Shift Operations*.

- reference to communication problems in the actual conversation. For example, not all discussants had equal "air time," and the discussion rules were not established. The reference to */Air Traffic Problems/* has two sub-literal referents. First, it refers to the standard T-group seating arrangement of *sitting in a circle*. Second, the conversation was perceived as *not going anywhere*, i.e., in common vernacular, it was just "going in circles" ([5.1.] *Semantic Association Operations*, [9.7.] *Vernacular Operations*).
19. The topic was about bartenders having the right to not */Serve/* a person if he or she has had too many drinks — which was said to be */For Instance, 3 Drinks/* or */If He Sees That You Cannot Handle More/*. That */3 Drinks/* was too many was generated by the older woman in the triad and is thus more normative and predictive from base-rate data on values relative to older age, versus a younger person saying that 3 drinks were too many ([2.3.] *Expectations*, [2.4.] *Knowledge Base*, [4.1.] *Resonance Operations*, [4.2.] *Sociometric Operations*).²²
 20. The topic of being */Under 21/* is consistent with spatial references to being */Down Behind Pantry Pride/* — a grocery store ([8.4.] *Single Number Operations*, [8.5.] *Addition Operations*). The topic about being */Under 21/* is also a sub-literal reference to the remaining discussants who were all younger than the 3 dominant members. As additional verification, almost immediately tagged to this phrase was the statement */Over Half of Them Were Under Age/*. The female discussants continuing this topic about people in a bar being under age, were themselves underage ([4.1.] *Resonance Operations*, [4.2.] *Sociometric Operations*).
 21. In the topic */3 of the 10 People/* the individual numbers */3/* and */10/* correspond to the actual group composition: the 3 leaders and the remaining 10 young female discussants. As in the first topic, the number */3/* gains additional validity by being directly part of a phrase that includes another significant number, the number */10/*. Combined, the 3+10 totals to 13. The significance of the number 13 is that it corresponds to the exact number of people in the group that day, including the researcher/trainer ([4.1.] *Resonance Operations*, [4.2.] *Sociometric Operations*, [13.5.] *Inclusivity and Exclusivity of Categorical Set Operations*).
 22. It is a significant associative linkage that topic 14 about a hypothetical */John Smith, 21 Years Old/* was generated by the younger of the 2 males in the triad (who either was or was nearing 21 years old) and, accord-

²²Previous versions of this narrative were partially incorrect. In returning to the protocol, the member generating this narrative was the older woman, not a younger member of the group. This correction, however, does not change the validity of the $S_{ub}L_{it}$ referent, only its validation properties.

- ingly, was not associated with the preposition */Under/*, i.e., *under* the control of the triad as were the other topics involving */21/* since he was a member of the dominant triad ([5.2.] *Dimensional Evaluative Vector Operations*, [5.3.] *Dimensional Vector Equivalence Operations*, [9.5.] *Prepositional Shift Operations*).
23. That discussants not belonging to the triad were subordinate to the triad is reflected associatively in the aspect of the topic */3 Weeks Ago/* that referred to a large group of people who were all */Down Behind/* a food market called */Pantry Pride/*. The phrase */Pantry Pride/* was an association to a previous session where the older woman in the triad said she was *proud* i.e., = pride, to be a homemaker i.e., = association to */Pantry/* (a small room or closet near a kitchen, in which food, silverware, dishes, etc., are kept). In other words, non triad members were shown to be subordinate to the older woman. Verification is also indicated by the dimensional vectors */Down/* and */Behind/*. The phrase */They Were All Down Behind/* with "they" equaling the larger group membership that was */Under/* the leadership of the dominant triad, one of whom was the older woman, is important for verification. For example, high status, i.e., being a leader, is invariably associated with the dimensional vector */Up/* and low status, i.e., being a follower, with */Down/* ([5.2.] *Dimensional Evaluative Vector Operations*, [5.3.] *Dimensional Vector Equivalence Operations*, [15.4.] *Dimensional Tracking of Deductive Subset Invariance Operations*, [15.5.] *Dimensional Tracking of Transformational and Permutational Invariance Operations*).
 24. In the topic */3 of the 10 People/* the continuing phrase */They Wouldn't Serve Any of Them/* is a reference to the rest of the group not accepting the leadership of the triad, that is, the remaining discussants would not */Serve/* as followers. This is important for validation because it is congruent with the remaining topics being associated with negativity toward the triad and that these topics were generated by non members of the triad. Conversely topics 1, 5, 7, and 12 were generated by the triad. In short, it can be expected that topics expressing negativity will be generated by discussants who were not part of the triad ([4.1.] *Resonance Operations*, [4.2.] *Sociometric Operations*).
 25. The delineated set of numerically triadic narratives can be expanded to a further set of related numeric references. For example, the fourteenth narrative involving the */3 of the 10 People/* is one such non-exclusive reference to the triad, with the number */10/* corresponding to the 10 young females in the discussion.

Again, a primary implication of the above structural, linguistic, and associative analyses is that the series is *internally consistent* and *structurally integral*. In order for this to occur throughout each representation and its other consis-

tently associated aspects (i.e., age, gender), narratives must somehow be cognitively (a) mapped, (b) tracked, and (c) stacked systemically throughout multiple levels as well as through the various story transformations and permutations, all remaining invariant with respect to the specific set of characteristics (e.g., numeric magnitude, age, gender, etc.) and meanings ([14.] *Matrix and Lattice Structure Validation Operations*, [15.] *Multicorrelative Transformational Validation Operations*).

[16.] *General Validation Considerations*²³

Having presented $S_{ub}L_{it}$ numeric narratives that demonstrate an internally consistent and integral set of operations, transformations, and permutations, it must be noted that logical consistency, while a necessary condition, is not a sufficient condition for validation ([15.1.] *Internal Order Structure Operations*, [15.2.] *External Order Structure Operations*). As fundamental as internal consistency is in yielding integral and logical coherence, by itself it only leads to a reliable system, not a valid one, as was the case with the Ptolemaic model of the solar system. In mathematics, "proof" of an equation or theorem is established only by its internal consistency, inference rules, and deductive properties. Establishing linkages with external empirical data are not required. With $S_{ub}L_{it}$ material, however, such external linkages, or correspondences are required. Without such linkages, the structure carries no meaning. While the fourteen integral references to the number /3/ are cognitively interesting by themselves, without matching and mapping correspondences to the narrative situation and context they remain an unexplained set of internal consistencies ([15.] *Multicorrelative Transformational Validation Operations*, [16.2.] *Nomological Validation Network*, [16.3.] *Falsification*).

[16.1.] *Levels of Analysis and Validation*

There are five basic levels of analysis and validation.

Level I is constituted by mapping, matching and contextual operations ([1.] *Analogical and Isomorphic Operations*, [2.] *Contextual Procedures*), whereby a literal narrative is shown to correspond to the characteristics of the narrative situation.

Level II is constituted by additional transformations or permutations of a base literal narrative ([3.] *Transformational, Permutational, and Transitional Operations*) that are also shown to consistently correspond to the characteristics of the narrative situation.

²³This heading and the following four are technically part of the methodology delineated in the Appendix but are more appropriately explained here.

Level III is constituted by demonstrating that Levels I and II are linked with other operations ([4.] *Psycho-sociometric Operations*), and that these linking operations integrally and consistently correspond to the transformations or permutations of the literal narrative.

Level IV is constituted by levels II and III forming structurally consistent lattice or matrix structures ([14.2.] *Lattice Structure Operations*).

Level V is constituted by higher order vector, syntactic and multicorrelative structures ([8.2.] *Syntactic Ordering Operations*, [15.] *Multicorrelative Transformational Validation Operations*).

Just as the pragmatic usefulness of an equation or theorem depends on how well they correspond to something empirical in the external world, so too do $S_{ub}L_{it}$ narrative structures depend on how well they correspond to actual narrative situations. This type of "proof" relies on $S_{ub}L_{it}$ references corresponding to empirical events, context, as well as other operations in the narrative situation. In philosophy this is known as the correspondence theory of truth (Nagel, 1961). For example, $1+1=2$ can be pragmatically validated by its applied correspondence to: 1 (egg), and 1 (other egg) = 2 (eggs). Similarly, the exponential law (equation), illustrated by the compounding of interest in a bank account, also corresponds to the growth of populations, the increasing number of journal articles, and a host of other real things. Internally consistent order structures and other operations are thus important for establishing reliability, whereas mapped order structures are important for establishing validity. Without external correspondences, the mathematic-like internal order may be interesting but does not refer to any empirical reality — just as the Ptolemaic model of the solar system was reliable but not empirically valid.

The findings presented here, however, do correspond to an empirical reality outside their own internal order. The "proof" of this method, then, lies both in its being a systematic and internally consistent set of cognitive and linguistic operations that, by way of a mapping and matching process, is in *correspondence* to an external empirical reality and context, the latter being the actual narrative situation and its dynamics [1.] *Analogical and Isomorphic Operations*, [2.] *Contextual Procedures*).

While the above triadic set of data does not afford the total possible array of operations, it nevertheless is sufficiently complete to illustrate how many of the logico-mathematic operations function together integrally. Any analysis of a given topic, then, will be validated within a nomological matrix (see below) by a given number of operations generating an integral and consistent structure. Certainly the procedural and cognitive operations presented here are neither typical nor easily amenable to standard cognitive or linguistic methodology. The robustness of the findings however, seem sufficiently veridical to warrant further programmatic research.

[16.2.] *Nomological Validation Network*

“Nomological” is a concept derived from Greek term “nomos” meaning “law.” As used recently the concept refers to a network of logical relations. Of course not all $S_{ub}L_{it}$ referents can be integrally validated across the complete array of operations. Validation and falsification procedures, then, derive from being sufficiently tied to an integral network of procedures and operations that exhibit a high degree of logico-formal correspondence and network plausibility across the entire analysis. Thus, logico-mathematic validation is a network concept comprised of varying degrees of interconnecting relationships. Each hypothesized $S_{ub}L_{it}$ narrative is thus evaluated, not in isolation, but in relation to direct and indirect relationships and procedures in the network of logically consistent and systemic cognitive and linguistic operations (a nomological network can be considered a form of construct validity).

Feigl (1956, after Cronbach and Meehl, 1955) describes such a system as a *nomological network*. In addition, if the term *methodology* is substituted for *theory*, Nagel (1961) makes a similar point on validation procedures suggesting that “A sufficient condition for a theory to be testable and to perform its function in inquiry is that enough of its theoretical notions be associated with coordinating definitions” (p. 271). Moreover, as Lachman, Lachman, and Butterfield (1979) noted, if cognitive psychology is going to make progress, it will have to give up the hope of validating each and every construct. Just as in modern physics, not only will empirical outcomes “weigh in the judgments but so will *formal adequacy*, sufficiency, plausibility, and other values” (p. 532).

[16.3.] *Falsification*

Falsification of hypotheses regarding $S_{ub}L_{it}$ material derive from the specific operations. Failure to meet validation requirements generally implies falsification. While hypotheses to simple references can be easily falsified, more complex ones require a nomological assessment. Minimally, falsification requires not meeting the standards of the above levels to some degree. This is indicated by a topic about */8 males dominating a group/* (a negative attribution) which is hypothesized as a sub-literal reference corresponding to the actual narrative situation. The hypothesis is falsified if (1) there is (a) no subgroup of 8 males and/or (b) there are 8 males who are not dominating a discussion ([1.1.] *Matching Operations*, [1.2.] *Isomorphic Mapping Operations*, [2.] *Contextual Procedures*), (2) the discussants who generate the literal narrative have demonstrated no concern about domination in the group ([4.1.] *Resonance Operations*), (3) the narrative is generated by one or more of the 8 males ([4.2.] *Sociometric Operations*), (4) if the number */8/* in the narrative refers to females ([4.3.] *Gender Reference Operations*), and (5) if the dimensional evaluative

vector operations are not consistent ([15.4.] *Dimensional Tracking of Deductive Subset Invariance Operations*, [15.5.] *Dimensional Tracking of Transformational and Permutational Invariance Operations*).

[16.4.] *Retrodiction and Prediction*

As a further validation process, given the consistency and logical structure of the entire array of linguistic and cognitive operations, it follows that in a narrative's analysis its structural and $S_{ub}L_{it}$ characteristics should be retrodictive to narratives in previous sessions and predictive of narratives in future sessions. This is instantiated by the following: if in analyzing current numeric narratives, previous numeric references should also map onto the number of discussants present. Further, numeric references in previous sessions should be consistent with current references. If not, then validity may be in doubt. Reviews of past sessions do show numeric consistencies.

Given the transformational and permutational structures found in the above series of numeric references to 3s, as well as the finding that this series conforms to an algebraic structure (Haskell and Badalamenti, 2003) — it seems reasonable to suggest that the findings lend validation power to the “less concise” $S_{ub}L_{it}$ semantic narrative analyses. There is reason to assume that the underlying cognitive structure of semantic narratives (though more difficult to recognize) should not be different from the structure of numeric narratives. Finally, just as the consistent dimensional vectors ([5.2.] *Dimensional Evaluative Vector Operations*, [5.3.] *Dimensional Vector Equivalence Operations*) function as a kind of grid to systemically situate and track narratives, so, too, do numeric references provide a structural framework in which to situate and track the semantic aspects of narratives.

Final Validation and Falsification Considerations

Analytical and validation operations are not mutually exclusive: linguistic and cognitive operations that provide the analytical procedures are also part of validation structures and operations. To the extent that these analytical operations are shown to be integrally and systemically related, they are involved in constructing the structures of validation.

Validation is based on (1) internal relationships of invariance constituting formally consistent sets and transformations of cognitive structures similar in form to arithmetic proofs and (2) external relationships of correspondences to empirical group interaction data. Thus, the method is neither causal nor linear but based on internal and external consistency and the invariance of a nomological formal structure (see below). There are two essential levels of validation: internal and external. Similar to that of mathematical structure,

internally there are integral, systemic, and consistent order structures and operations, with these yielding logical coherence and reliability. Further, there are mappings and matchings of *external* contexts to these internal corresponding structures in the same way that an exponential formula corresponds to the growth of populations, as well as to a host of other real things in the world.

A Logico-formal Summary of Operations and Validation Structures

The following idealized summary has been abstracted from the array of cognitive and validation operations and demonstrates the core structural and logical nature of the methodology. Any unprincipled contraindication within this idealized analysis would indicate a degree of falsification of a particular hypothesis (see [16.2.] *Nomological Validation Network*, [16.3.] *Falsification*).

1. The general meaning of a literal topic X is found to *match* the concrete narrative situation ([1. 1.] *Matching Operations*).
2. A finer grain analysis also shows that topic X with its further specific characteristics and attributes $X_{abc\dots n}$, are found to *map* onto, and are isomorphic with, the actual narrative situation ([1.2.] *Isomorphic Mapping Operations*).
3. Matching and mapping are found to be consistently congruent with what is contextually, historically, and developmentally known ([2.1.] *Current and Historical Contextual Data*, [2.2.] *Developmental Stage*, [2.3.] *Expectations*) about (a) the narrative situation, and (b) topics analogically corresponding to the known expectations and concerns of the discussants generating the narratives ([4.] *Psycho-sociometric Operations*, [4.1.] *Resonance Operations*).
4. Further, the content of topic $X_{abc\dots n}$ is congruent with the physical and psychological selection constraints of the narrative situation ([2.5.] *Selection Response Field*), where possible lexical and physical selection alternatives are consistent with the topic.
5. Continued matching and mapping operations demonstrate additional sets of literal topics, $X'_{abc\dots n}$ and $X''_{abc\dots n}$, which are found to be surface transformations of the original topic $X_{abc\dots n}$ each expressing the same general affective schema but using different topic content or surface-structure representations ([3.1.] *Transformational Operations*).
6. Other topics are found to be *permutations* of X , i.e., $X^1_{abc\dots n}$, $X^2_{abc\dots n}$, with each expressing a different aspect of the basic affective schema ([3.2.] *Permutational Operations*). In support of this, the concern expressed in each permutation topic is found to belong to the same logical class and corresponds to the same affective schemata extant in the nar-

rative situation ([3.3.] *Transitional Narratives*), as indicated by specific linguistic expressions ([3.4.] *Transitional Linkage Operations*).

7. Consistently, discussants generating topic X are those discussants experiencing the affective schema about the actual narrative situation that the sub-literal referent or topic X expresses ([4.1.] *Resonance Operations*).
8. Similarly, discussants generating topics containing *gender* and/or *age* reference distinctions are the discussants who experienced gender and age affective schemata in the narrative situation expressed by the hypothesized sub-literal referent of the topic ([4.3.] *Gender Reference Operations*).
9. Significantly, and in summary to this point, based on affective and motivational considerations, all sets of narratives are psycho-dynamically, sociometrically ([4.] *Psycho-sociometric Operations*) and isomorphically correspondent and logically consistent. Thus, if sub-literal referents are generated from affective schemata, it follows that discussants generating topics with such hypothesized referents are those experiencing the schemata in the actual narrative situation.
10. Other semantic operations ([5.1.] *Semantic Association Operations*) to topic X are found to be logically and structurally congruent with the above operations. For example, dimensional (prepositional) vectors associated with each topic transformation and permutation are consistent with the literal narrative vectors ([5.2.] *Dimensional Evaluative Vector Operations*, [5.3.] *Dimensional Vector Equivalence Operations*), i.e., if the content of topic X is associated with being */up/* meaning high status, then all transformational, i.e., $X'_{abc\dots n}$ and $X''_{abc\dots n}$, as well as permutational $X^1_{abc\dots n}$, $X^2_{abc\dots n}$ narratives, should also be associated with the vector */up/*. This is especially significant for validation.
11. In addition, unconsciously generated physical gestures may correspond to the sub-literal referent ([6.1.] *Ocular Operations*, [6.2.] *Gestural Operations*). For example, automatically activated minute ocular and/or hand or body gestures may be directed toward the narrative member about which the topic is sub-literal.
12. Names and initials ([7.1.] *Names*, [7.2.] *Initials*) in topic X and its transformations and permutations also match and map onto discussants' names and initials in the narrative situation ([7.1.1.] *Embedding*, [7.1.2.] *Fusions*) as indicated by a number of consistent and corresponding semantic and phonological operations (e.g., [8.1.] *Homophonic Operations*, [8.1.2.] *Oronymic Operations*, [8.3.] *Portmanteau Operations*, [8.4.] *Paronymic Operations*) as well as syntactic operations ([8.2.] *Syntactic Ordering Operations*), along with shifting and tagging operations ([9.] *Linguistic Shifting and Tagging Operations*, [9.1.] *Temporal Shift*

- Operations, [9.2.] Noun Shift Operations, [9.3.] Adjectival Shift Operations, [9.4.] Plural/Singular Shift Operations, [9.5.] Prepositional Shift Operations, [9.6.] Linguistic Tagging Operations).*
13. Consistent across topic transformations and permutations and with other operations as noted above, $S_{ub}L_{it}$ referents are generated by consistent reversal and inversion operations ([10.] *Reversal, Inversion, Opposition Operations*), as indicated by textual content ([10.1.1.] *Textual Expressions*), as well as strategic memory distortions that are consistent with the above operations ([11.1.] *Memorial and Perceptual Reconstruction Operations*).
 14. Just as with semantically expressed topics, numeric expressions within topic X and its transformations and permutations are found to be a consistent set of $S_{ub}L_{it}$ representations of the sub-grouping factions within the narrative situation ([12.] *Arithmetic Operations*). This is partly indicated by the numeric values mapping onto and thus matching the narrative membership composition, and is further supported by the particular numeric values expressed being consistently adjusted in subsequent topics to match changes in membership or sub-grouping occurrences ([12.1.2.] *Numeric Recomputation Operations*), as well as by numeric representations consistently matching the narrative sub-group factions by gender and other relevant demographics ([13.] *Logico-mathematic Representation Operations*).
 15. As a further validation process, given the consistency and logical structure of the array of linguistic and cognitive operations, it follows that with any given narrative analysis the structural and $S_{ub}L_{it}$ characteristics should be retrodictive to numeric narratives in previous sessions and predictive of numeric narratives in future sessions ([16.4.] *Retrodiction and Prediction*).
 16. In analyzing and validating the internal cognitive structures manifested in a set of narratives and their transformations and permutations, as well as their various affective aspects from which the $S_{ub}L_{it}$ levels are partially derived, each topic can be assigned to cells within a cognitive matrix series ([14.1.] *Matrix Structure Operations*). Together these matrices form a kind of cognitive lattice structure composed of the base matrix (M_0) and a series of transformational matrices (M_1, M_2, M_3, M_4), the cells of which contain the different levels of $S_{ub}L_{it}$ material that structurally correspond to the cells in the generative base or literal matrix. Each tier can be seen as an harmonic of the others, analogous to a frequency that is an integral multiple of a base frequency ([14.2.] *Lattice Structure Operations*) [see Figures 4 and 5 above].
 17. To conclude, validation of the topic X series involves systemic intra- and inter-narrative multicorrelative transforms ([15.] *Multicorrelative*

Transformational Validation Operations), the basic operations of which involve logically deductive sets such that if a narrative X is consistently associated with a given characteristic or set of characteristics, i.e., $X_{abc\dots n}$, ([5.] *Associational and Dimensional Operations*), then it follows that the corresponding subsets of transformations of narrative $X_{abc\dots n}$, i.e., $X'_{abc\dots n}$, $X''_{abc\dots n}$ and its *aligned* permutations, $X^1_{abc\dots n}$, $X^2_{abc\dots n}$, should consistently exhibit the identical characteristics and other associated attributes which can thus be tracked throughout the entire series of lattice-like matrices (see [1.3.] *Alignment*).²⁴

Again, if these consistent and integral logico-mathematic operations are valid, then the (1) mapping, (2) tracking, and (3) stacking of the structures involved in these operations demand explanation. Any contrary indication within this idealized analysis would mean a degree of invalidation of the particular operation ([16.2.] *Nomological Validation Network*).

Finally, given the integral and systemic structures found with the above series of narratives, along with a finding that a series of narratives conforms to an algebraic structure (Haskell and Badalamenti, 2003), it seems reasonable to suggest a cross-over validity to the somewhat less concise *semantic* analysis of narratives and to assume that the cognitive structure of *these* narratives would be subject to the same undergirding structure as numeric narratives (see *First Extended Exemplification: Phonetic and Syntactic Structure*, pp. 357–360, for a highly structured semantic instantiation).

Conclusion

In summary, given the foregoing findings, addressing the set of seven fundamental questions posed at the opening of this paper (p. 353), the questions of why, out of all possible topics or narratives, a particular topic is introduced into a conversation at a particular time, and why it is elaborated on, the answer is because it allows the expression of concealed fears, personal feelings, attitudes, and beliefs. As to why the content, structure, or plot of a topic or story in a conversation match what is happening in the actual narrative situation, it is likely because the parallel structure or plot resonates and emotionally derives from similar past or current schemata. Why a topic or story is repetitively transformed and permuted into variations is because story variations allow individuals to further express different sub-literal aspects of a basic affective schema. The answer to the final question as to why various structures of the transformations and permutations of an initial topic and

²⁴For initial conceptualization of alignment, see Haskell (1968b, 1978, 1982). More recently Markman and Gentner (1993) have developed a concept of alignment.

story are all internally consistent and integrally parallel, it is likely because the mind/brain efficiently stores and retrieves information in that manner.²⁵ It is easier to store and retrieve abstract or generically structured “chunks” of data, than to store and retrieve structurally unrelated information.

The linguistic, cognitive, and structural operations delineated conceptually cut across research issues and areas in cognitive science. The theoretical base for the methodology has been in development for some time, and the cognitive and neurological processes subserving $S_{ub}L_{it}$ cognition are implicit in Haskell (1989, 2000, 2001, 2002, 2004). Further, the non metric methodology presented here can be applied to everyday verbal narratives, thus lending a more ecologically valid (Neisser, 1976) approach to $S_{ub}L_{it}$ language and meaning in narrative analysis.

Although some $S_{ub}L_{it}$ narratives and operations strain common sense, they provide further insight into the standard understanding of language and cognitive processes, just as have other phenomena once thought to be anomalous, e.g., optical illusions. Finally, while some of the presented findings may not stand the scrutiny of future research, the fundamental operations and framework will likely remain. Continued methodological and theoretical research needs to be developed to expand our understanding of $S_{ub}L_{it}$ phenomena and their relationship to areas already developed in psycholinguistics and cognitive science.

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²⁵See specifically chapters eleven and twelve in Haskell (2000).

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Appendix: Methodological and Cognitive Operations

The following cognitive, linguistic and structural operations with their attendant $S_{ub}L_{it}$ meanings have been consistently found across multiple narrative protocols. Findings that the following set of operations are congruent, correspondent, and logically consistent with a given hypothesis of $S_{ub}L_{it}$ meaning confers validational support. The following set of operations constitute answers to the set of seven questions asked above; collectively they systemically constitute a nomological network of validation (see [16.2.] *Nomological Validation Network*).

[1.] *Analogical and Isomorphic Operations*

[1.1.] *Matching Operations.* Words, phrases, and story structures in narratives are compared to (a) membership composition of the verbal narrative situation, (b) past history of individual and group behavior, and (c) other contextual data. Matching is accomplished using both concrete and abstract similarity relationships between the words, phrases, story structure, and the actual narrative situation.

Instantiation. With a topic about */Journalism/* the narrative is matched to a discussant writing notes on the verbal interaction. This is a concrete correspondence to the topic of *journalism*. Thus, the topic */Journalism/* is initially hypothesized as a sub-literal match to the act of *note taking* occurring in the narrative situation. The hypothesis may be further supported when contextual evidence suggests a match between the topic and an affective schema of discussants pertaining to being observed and written about ([2.] *Contextual Procedures*, [4.1.] *Resonance Operations*).

[1.2.] *Isomorphic Mapping Operations.* The hypothetical match is then further mapped on to the composition structure of the interaction (concrete relationship). Mapping is a higher-order extension of the matching process.

Instantiation. If a verbal narrative specifies */3 Journalists/* when only 3 discussants are actively taking notes and no other triadic composition structure is evident, then the validity of matching the topic of */3 Journalists/* to the 3 discussants is initially posited.

[1.3.] *Alignment.* Mapping and matching involves "alignment," the process of ordering of the component elements of one "set" or series of sets upon another as in narrative permutations.

Instantiation. Given a source characteristic of X_{1437} , target characteristics must have the same underlying alignments, X'_{1437} . They can not be X'_{1743} (see [3.2.] *Permutational Operations*; higher order alignment is implied in: [14.] *Matrix and Lattice Structure Validation Operations*, [15.] *Multicorrelative Transformational Validation Operations*, [15.4.] *Dimensional Tracking of Deductive Subset Invariance Operations*, [15.5.] *Dimensional Tracking of Transformational and Permutational Invariance Operations*).

[2.] Contextual Procedures

The context of a narrative situation is important in analyzing $S_{ub}L_{it}$ reference just as context is necessary for understanding the meaning of any narrative. Context includes understanding both the cultural and immediate interactional surround of a narrative situation as well as the history of the narrative situation. It also includes developmental aspects, discussant's expectations, as well as knowledge of social and group dynamics. The following operations provide "validation contexts" for mapping $S_{ub}L_{it}$ semantics and referents.

[2.1.] *Current and Historical Contextual Data.* For matching, mapping, analyzing, and validating, contextual information from both cultural and from current and past sessions is evidential and necessary for hypothesizing $S_{ub}L_{it}$ reference. These function as cognitive schemata for generating $S_{ub}L_{it}$ meaning.

[2.1.1.] *Cultural Contexts.* Cultural expectations and beliefs function as undergirding contexts in any given narrative situation (see [2.3.] *Expectations*).

Instantiation. Beliefs, expectations, and experiences about a deity often undergird member perception of, and subserve, sub-literal references to *authority figures* within the actual narrative situation. These can be expressed analogically as follows.

Above : Below :: God : Mankind :: Parent : Child :: Employer : Employee

[2.1.2.] *Narrative Situation Contexts.* If a past or current narrative session shows that discussants exhibit affective schemata about notes being taken during a narrative session, then topics will reflect this schemata.

Instantiation. If either in the current narrative session or in previous narrative sessions concerns about note-taking have been evident, then the context evidentially supports the topic of *Journalists/* being a sub-literal referent.

[2.1.3.] *Linking Contexts.* Given the above two contextual schemata, one serves as a linkage to the generation of the other.

[2.2.] *Developmental Stage.* The content of an hypothesized $S_{ub}L_{it}$ referent is matched with affective schemata that are correlated with what is known about the issues and concerns within each stage of group development. Affective schemata and issues are typically congruent and consistent with the developmental stage of the group.

Instantiation. In the initial stages of a discussion, narratives are typically about (a) *power and authority relations*, (b) "beginnings," where topics are about *a new job*, about *being newly weds*; later stages involve narratives about (c) *conflict*, using narratives of

movies like *Star Wars*, *disaster movies* or about musical groups *breaking up*. Then, as the conflict situation resolves, narratives often shift to (d) *automobile traffic problems*, or *how to grow plants*, or *how to build houses*, indicating the development of norms; finally, (e) as a group nears its end, narratives may be about *separation and loss*, *death*, *funerals* or *divorce*.

[2.3.] *Expectations*. In analyzing narratives for $S_{ub}L_{it}$ referents, understanding the expectations that discussants have about the narrative situation is important.

Instantiation. It is known that behavior is influenced by expectations and beliefs about (1) social narrative situations and how they should function, (2) leadership and authority relations, (3) acceptable social behavior, (4) stereotypes about (a) gender, (b) sexual preference, (c) race and ethnicity, (d) age, and other expectations and beliefs about (e) sexual tensions in relationships, and (f) human conflicts in general. The narrative should be specifically congruent with these expectations and beliefs.

[2.4.] *Knowledge Base*. Although much of $S_{ub}L_{it}$ analysis is based on fairly direct observation and mapping of actual dynamics in the narrative situation, other analyses are based on additional kinds of data about social situations.

Instantiation. The following kinds of knowledge are important: (1) collective or group dynamics, (2) leadership and authority dynamics, (3) data about the specific group, e.g., (a) sub grouping and coalition forming, (b) the composition of the group, (c) the stage of development achieved by the group, and (d) knowledge of the dynamics in past sessions, (4) social psychological research, e.g., (a) expectations and beliefs that discussants have about groups and how groups should function, (5) norms of acceptable social behavior, (6) social stereotypes about (a) gender, (b) sexual preference, (c) race and ethnicity, and (d) age, (7) individual group discussants, e.g., (a) what each has said and done in past sessions, and (b) thoughts and feelings that are not expressed, or that are not conscious, (8) general knowledge about (a) various tensions in human relationships, and (b) human conflicts. Analyses of narratives should be congruent with such knowledge.

[2.5.] *Selection Response Field*. In narratives, the numbers, names, topics, sounds, words, and phrases that can be selected for discussion are practically infinite. Thus, for all narratives and the specific language used to express them, it must be asked why the particular and specific topic, word, or phrase was selected. Both context and purpose (conscious or unconscious) create constraints on this selection process. The history, current contexts, and affective schemata of a narrative situation provide a basis for understanding the constraints on the selection of topics.

Instantiation. A topic about a children's TV program, called */Mr. Roberts/* was selected for a discussion because (1) the discussant who selected the topic is surprised by the presence of a television and a microphone, hence increasing the possibility of constraining the response field to a remark about television, (2) the topic combined the discussant's basic and immediate feelings about the narrative situation, which in this

case was primarily a concern with the researcher/trainer, hence selecting a TV program that had a clear leader in its title, (3) the discussant is also surprised at seeing a child in the group, further narrowing the response field to children's television programs, (4) the discussant had been counter-dependent and considered the small group process a childish one, (5) the researcher's/trainer's name /Robert/ narrows the response field to a children's television program that has a leader whose name begins with at least an /R/ ([7.] *Nominal Semantic Operations*).

Major Cognitive Operations²⁶

At their base, many of the validation operations can be reduced to "if . . . then" statements as well as to logically consistent and deductive relations.

[3.] *Transformational, Permutational, and Transitional Operations*

[3.1.] *Transformational Operations*. Each affective schema may be repetitively transformed into a series of $S_{ub}L_{it}$ narratives. While the content representation mode of these transformed narratives changes form, they retain the same value (i.e., meaning).

Instantiation. An affective schema about a dominant triadic subgroup is transformed into topics involving (a) /3 Drinks/ (b) /3 Hours/ and (c) /3 Days/ etc. Each transformation is a representation of the 3 dominant discussants in the narrative situation.

[3.2.] *Permutational Operations*. Each affective schema may be permuted into a series of $S_{ub}L_{it}$ narratives of which the structural mode of representation changes form but which retains the same value. Unlike transformations that are more global in their representational mode, permutations are representations that break down or differentiate the global (or general) schema about 3 dominant discussants into its component parts. This can be seen in the semantically expressed content of permutations (see *Instantiation 1a* below) — and most clearly seen in the numeric decompositions of the topic (see *Instantiation 1b* below).

Instantiation 1a. Based on previously expressed concerns about the role of 3 dominant discussants (1) a narrative about /3 Warehouses/ represents an affective schema that the triad is a depository of knowledge about the group dynamics, (2) a /3 Old Greyhound Buses/ narrative represents a disconcerting recognition that the triad is driving and steering the entire group narrative, (3) a narrative about /3 Lucky Spots/ represents a recognition that the triad is likely favored by the researcher/trainer.

²⁶Instead of using all different topics to instantiate each operation, certain topics have been used multiple times. This provides continuity and highlights the integral structure of the methodology.

Instantiation 1b. The differentiations generated by the affective schema about the 3 dominant discussants is exemplified in the numeric topic /*This 1 Girl Who Was With 2 Guys*/ which decomposes the global schema into the subschema about the gender composition of the triad (see above *Second Extended Exemplification: Parsing and Validating the Triadic Structure of a Single Numeric Narrative Series*).

[3.3.] *Transitional Narratives.* A transitional narrative is one that belongs to the same category as the actual affective schema that generated it. Transitional narratives provide direct links to an actual narrative situation since they belong to the same category as the narrative situation and are typically indicated by particular linguistic phrases ([3.4.] *Transitional Linkage Operations*).

Instantiation. In a narrative situation where the affective schema is about the instructor as an authority figure, a transitional narrative will be about another instructor who is an authority figure as opposed to narratives about other kinds of authority figures such as police or priests.

[3.4.] *Transitional Linkage Operations.* Transitional narratives are typically indicated by particular linguistic phrases. These phrases function as transitional linkages to the actual narrative situation.

Instantiation. Narratives are sometimes consciously or nearly consciously linked to the actual narrative situation by such phrases as /*Like in Here*/ or as in a narrative about psychiatric patients and convicted criminals where it was said that some of these patients and convicts are going to school /*Here, Now*/. Such linkages are shifting and tagging operations (see [9.] *Linguistic Shifting and Tagging Operations*).

[4.] *Psycho-sociometric Operations*

[4.1.] *Resonance Operations.* Resonance refers to discussants in a narrative who are either psycho-emotionally involved or not involved in expressing a narrative to which the $S_{ub}L_{it}$ meaning of the narrative refers. Some narratives are expressed by discussants who, by historical and/or contextual analysis, have an affective involvement in the concern expressed in the $S_{ub}L_{it}$ material. Conversely, other narratives are not expressed by discussants who, by historical and/or contextual analysis, do not have an affective involvement in the concern that the $S_{ub}L_{it}$ material expresses.

Instantiation. A discussant not concerned about someone taking notes in a narrative situation will not generate a topic of /*Journalists*/ which is a sub-literal reference to the narrative setting. As would be expected, such narratives are generated by those who are known to have an affective schema about note taking.

[4.2.] *Sociometric Operations.* A variant on the previous operation is that the content of a $S_{ub}L_{it}$ narrative will match or correspond to the actual

relationship of discussants who produce the material correspondent to their actual status in the narrative situation.

Instantiation. Unless otherwise contextually indicated, narratives expressing negativity about /3 Journalists/ are generated only by nonmembers of the 3 discussants who are taking notes and who are the subject of concern. Conversely, narratives expressing positive meaning about this triadic structure are produced by discussants of that subgroup or by others who have demonstrated positive psycho-sociometric resonance to the triad (see [4.1.] *Resonance Operations*).

[4.3.] *Gender Reference Operations.* Narratives which identify gender relationships match the actual gender composition in the narrative situation to which the narrative sub-literally refers.

Instantiation. When a narrative is about /3 Journalists/ 2 of whom are male and 1 is female, it is hypothesized that the topic is a sub-literal reference to the 3 discussants in the narrative who are taking notes and will match the actual gender composition of 2 males and 1 female.

[4.4.] *Age Reference Operations.* Narratives which identify age relationships match the actual age differentials in the narrative situation to which the narrative sub-literally refers.

Instantiation. When narratives about /3 Seniors/ and /3 Old Greyhound Buses/ map onto the actual age differential of the 3 dominant discussants, it is hypothesized that the topics are a sub-literal reference to the age of the dominant discussants.

[4.5.] *Generic Operations.* Nouns are often used generically in order to express sub-literal meaning.

Instantiation. The noun /Girl/ which conventionally indicates a young female is used as a generic gender reference to include an older female. The context in which a generic reference is used will typically indicate how the term is being applied.

[5.] *Associational and Dimensional Operations*

[5.1.] *Semantic Association Operations.* Affective semantic evaluations contained in, or which are about, an actual narrative situation will consistently match $S_{ub}L_{it}$ affective evaluations by the discussants who generate the literal material.

Instantiation. A narrative about /3 Journalists/ that contains a pejorative reference will correspond to 3 discussants in a narrative who are taking notes and toward whom the remaining discussants have negative feelings.

[5.2.] *Dimensional Evaluative Vector Operations.* References in narratives that are associated with spatial dimensions of being /Up/ in /Front/ or /Down/ in /Back/ with the dimension /Up/ in /Front/ equaling positive affect, and /Down/ in /Back/ equaling negative affect, reflect affective evaluations that structurally correspond to positive or negative evaluations of discussants.²⁷

Instantiation. If 3 discussants taking notes in a narrative situation are affectively experienced by other discussants as being in a superior status, all narratives, e.g., /3 Journalists/ which are sub-literal references to the 3 discussants, will be consistently and contextually associated with and described as being /Up/ in /Front/ as opposed to being /Down/ in /Back/.

[5.3.] *Dimensional Vector Equivalence Operations.* Narratives are systematically and consistently associated with other equivalent spatial dimensions, for example, on the /Left/ as opposed to on the /Right/.

Instantiation. In addition to the above narrative describing /3 Journalists/ being /Up/ in /Front/ sub-literal references can be tracked to the associated cognitive equivalent vectors of being on the /Right/ as opposed to on the /Left/ which, respectively, are associated with being /Up/ in /Front/ as opposed to being /Down/ in /Back/. Vectorial tracking is consistent across (a) multiple transformations and permutations of the narrative of /3 Journalists/ and (b) its sub-literal equivalents (see [15.5.] *Dimensional Tracking of Transformational and Permutational Invariance Operations*).

[6.] *Parallel Psychomotor Operations*

Parallel psychomotor operations are significant adjuncts for analyzing and establishing the validity of $S_{ub}L_{it}$ referents. Being outside the linguistic production system, these unconscious corresponding psychomotor operations add another dimension of matching and mapping operations ([1.1.] *Matching Operations*, [1.2.] *Isomorphic Mapping Operations*).

[6.1.] *Ocular Operations.* Sub-literal meaning is often indicated and simultaneously accompanied by unconscious micro eye movements in the direction of the person being referenced.

Instantiation. Discussants may briefly shift their gaze during the narrative about /3 Journalists/ in the direction of the 3 discussants to whom the sub-literal meaning refers.

[6.2.] *Gestural Operations.* Narratives are often accompanied by unconscious hand movements that are congruent with the $S_{ub}L_{it}$ referent.

Instantiation. Indicating sub-literal meaning to the topic of /3 Journalists/ discussants may unconsciously point in the direction of the 3 discussants to whom the sub-literal meaning refers.

²⁷Similar dimensional operations (though conscious) have been noticed by anthropologists and linguists (e.g., Kinder, 1991; Levi-Strauss, 1966; Sommer, 1991) in both language and spatial layout of villages.

[6.3.] *Body-positioning Operations*. Sub-literal narratives may be indicated and simultaneously accompanied by unconscious body positions and movements.

Instantiation. Generating a narrative about being */King of the Mountain/* or */Being on Top/* i.e., physically or in terms of status, a discussant may *sit on the top* of the backrest of a chair (with his or her feet in the seat) structurally and physically reflecting the discussant's perception of his or her high-status position in the group.

[7.] *Nominal Semantic Operations*

[7.1.] *Names*. Names in narratives are often used as $S_{ub}L_{it}$ references to discussants in the narrative setting and can be recognized by being (a) of the same last or first name or by being (b) a modified representation of the discussant's name.

Instantiation. A narrative about the movie director */Stanley Kubrick/* is a sub-literal reference to a discussant whose name is */Kulick/* ([8.] *Phonetic and Syntactic Ordering Operations*, [8.4.] *Paronymic Operations*).

[7.1.1.] *Embedding*. Names or initials in narratives that are $S_{ub}L_{it}$ references to discussants may be embedded within other names or phrases.

Instantiation. The phrase */Foolhardy/* is used to represent a person who engaged in a foolish action whose last name is */Hardy/*.

[7.1.2.] *Fusions*. Names or initials in narratives that are $S_{ub}L_{it}$ references to discussants may be fused within another name or phrase.

Instantiation. The word */sunlight/* is constructed from two discussants' names, one an older woman whose name is */Firestone/* (represented by sun, i.e., a big stone of fire), the other name being that of a male young enough to be her son (phonetically represented by sun), whose name is */Wright/* (i.e., phonetically or by rhyme equal to *light*); hence, */Firestone/ + /Wright/* equals *sunlight* (see [8.] *Phonetic and Syntactic Ordering Operations*).

[7.2.] *Initials*. Initials in narratives may be used as $S_{ub}L_{it}$ references to discussants in the narrative situation and can be recognized as letters that are part of the first and last letters of a first and last name. Initials may be in the correct order or reversed, see ([10.] *Reversal, Inversion, Opposition Operations*).

Instantiation. The name of a writer and author */Harold Robbins/* is generated as a sub-literal reference to the researcher/trainer writing notes, with the beginning letters in the first and last names representing the researcher's/trainer's initials, R.H. reversed (consistent with [2.2.] *Developmental Stage*, [4.] *Psycho-sociometric Operations*).

[8.] *Phonetic and Syntactic Ordering Operations*

[8.1.] *Homophonic Operations.* There are hundreds of homophonic words that are pronounced alike but which have different meanings or spellings that are used to construct $S_{ub}L_{it}$ referents. There are also homographs, words that are spelled alike but have different meanings or pronunciations like *bow*, as in the *bow* of a ship and *bow* as in a *bow* and *arrow*.

Instantiation. A woman at a male podiatrist's office talked about clients /*baring*/ their /*souls*/ to him, while having the *bare soles* of her feet massaged.

[8.1.2.] *Oronymic Operations.* Sub-literal meanings are often made possible from strings of sounds that can be heard in two different ways and that can have two different referents, e.g., /*The stuffy nose*/ = /*The stuff he knows*/.²⁸

Instantiation. A topic about a club called /*The Explorers*/ is heard as *explore* + *her*.

[8.1.3.] *Phonetic Operations.* Narratives often generate $S_{ub}L_{it}$ referents by phonetic transformations similar to punning, double entendres, and other plays on words.

Instantiation. Expanded in first exemplification above (see p. 357).

[8.2.] *Syntactic Ordering Operations.* These operations refer to grammatical relationships in which words used homophonically as $S_{ub}L_{it}$ references are ordered in a manner corresponding to the status order of their references.

Instantiation. Also expanded in first exemplification.

[8.3.] *Portmanteau Operations.* Portmanteaus or portmanteau-like words and meanings are often used in the generation of $S_{ub}L_{it}$ referents by merging the sound and meaning of two different words.

Instantiation. In a narrative about what was perceived to be a soft-core child pornography poster with two nude infants who are about two years old, it is said /*I Guess People Need Diversions*/. The spoken word *diversions* is pronounced with a slur, making it sound like *di-virgins*. The two nude babies on the poster were represented by: (*di*) equals *two* (*versions*) equivalent to *virgins* — or two *virgins* ([7.1.2.] *Fusions*).

[8.4.] *Paronymic Operations.* Paronymic words derive from the same root or stem as another word, like *meanie* and *meaning*. Words that are graphically paronymic-like are used to generate $S_{ub}L_{it}$ meaning.

²⁸It is a given in linguistics that in the continuous flow of speech there are few if any clear demarcations between words. Slicing this flow requires a *constructive* process (see, e.g., Pinker, 1994).

Instantiation. In a discussion with an African-American female, who was originally from /*Georgia*/, a sub-literal linkage is established by a reference to a gift given by her to a member, with the recipient emphasizing that it was /*gorgeous*/ ([7.1.] *Names*).

[9.] *Linguistic Shifting and Tagging Operations*

[9.1.] *Temporal Shift Operations.* Sub-literal references often involve temporal shifts that tag a narrative about a past event as being psychologically experienced in the present tense, indicating $S_{ub}L_{it}$ referents.

Instantiation. A narrative about /*3 Guys*/ who were /*Talking Funny*/ a sub-literal reference to 3 male discussants who were verbally joking with each other within their subgroup, is shifted to the present tense in the topic /*3 Guys Who Are Talking Funny*/.

[9.1.1.] *Pronoun Shift Operations.* Like temporal shifts, $S_{ub}L_{it}$ references often involve corresponding pronoun shifts, which link a narrative to its $S_{ub}L_{it}$ referent.

Instantiation. A narrative about /*Those 3 Guys Who Were Acting Funny*/ is changed as the narrative progresses to /*These 3 Guys Who Are Acting Funny*/ or from /*That/Guy Was Acting Funny*/ to /*This/Here Guy Is Acting Funny*/ thus supporting the hypothesis that the narrative is a sub-literal reference to males who are acting strangely in the narrative setting (see [9.1.] *Temporal Shift Operations*).

[9.2.] *Noun Shift Operations.* Narratives often involve noun shifts appropriate to the $S_{ub}L_{it}$ meaning. These shifts link the topic to the narrative situation.

Instantiation. In a numeric narrative about /*3 of 10 People*/ in a bar, the number /*3*/ is a sub-literal reference to the 3 dominant discussants, and the number /*10*/ a reference to the remaining group membership who were younger than the 3 dominant discussants. That this is sub-literal is indicated by the /*3*/ being linguistically referred to as /*people*/, whereas the /*10*/ is linguistically referred to as /*kids*/, that is, because the 3 dominant discussants are older (and age is an affective concern), selecting the noun /*kids*/ in the reference to /*3*/ would not be sub-literally congruent in distinguishing the 3 dominant older discussants from the rest of the 10 discussants who are younger. The collective noun /*people*/ is age-neutral, whereas the collective noun /*kids*/ would only be appropriate in association with the 10 younger discussants (consistent with [4.2.] *Sociometric Operations*, [12.] *Arithmetic Operations*, [13.] *Logico-mathematic Representation Operations*).

[9.3.] *Adjectival Shift Operations.* Nouns used in narratives are often shifted to adjectives and adverbial forms to express $S_{ub}L_{it}$ referents.

Instantiation. In [8.1.3.] *Phonetic Operations*, the proper noun /*Harry*/ is sub-literally shifted in meaning to the adjective /*hairly*/.

[9.4.] *Plural/Singular Shift Operations*. Narratives often involve plural shifts appropriate to the $S_{ub}L_{it}$ meaning, which links a topic to the actual narrative situation (consistent with [9.3.] *Adjectival Shift Operations*).

Instantiation. A narrative by a white discussant about a */Black Hole/* in outer space is hypothesized to be a sub-literal reference to a single African-American male discussant. The typical use of the plural to describe the phenomena, i.e., black holes, is shifted to its singular form of */Black Hole/*. The singular term is more congruent with the existence of only a single African-American male who was an *unknown quantity* to the otherwise all white discussants.

[9.5.] *Prepositional Shift Operations*. Prepositional phrases shift from adverbial to adjectival function.

Instantiation. In the narrative about being */Under 21/* meaning under-age, the term */Under/* is used to sub-literally refer to a *lower status* position than that of the dominant discussants.

[9.6.] *Linguistic Tagging Operations*. Topics in narratives are often verbally tagged to either (a) signal an approximation to a reference that would not fit the intended $S_{ub}L_{it}$ referent if it were exactly referenced, or (b) indicate two different referents simultaneously.

Instantiation. The size of a subgroup is said to be */About 10 or 11/* or */Something Like That/* with the */About/* and */Something Like That/* making it possible to reference two subgroups simultaneously: the 10 discussants which would total 11 if the researcher/trainer was included (consistent with [11.1.] *Memorial and Perceptual Reconstruction Operations*, [12.1.4.] *Numeric Approximation Operations*).

[9.7.] *Vernacular Operations*. Phrases may be used as vernacular expressions to indicate $S_{ub}L_{it}$ meaning.

Instantiation. The name of a bar called the */3 Lucky Spots/* is used in the vernacular to sub-literally reference the 3 people who hold the *high status positions*, i.e., in vernacular, they hold the *lucky spots*.

[10.] *Reversal, Inversion, Opposition Operations*

[10.1.] *Reversal Operations*. Reversals of names and initials in narratives are cognitive operations that express $S_{ub}L_{it}$ negation of the person being referenced ([7.2.] *Initials*).

Instantiation. The name of a journalist */Harry Reasoner/* is selected to correspond to the researcher/trainer taking notes in the discussion whose initials are R.H. Negation is expressed by the initials of the name */Harry Reasoner/* being the reverse of the researcher's/trainer's initials.

[10.1.1.] *Textual Expressions*. Reversals are used to express negation only when the text or context in which the initials are used does not indicate negative meaning.

Instantiation. In a narrative referencing the researcher/trainer, his (un reversed) initials, R.H., expressed in the topic */Rh-negative Blood/* was selected. Since the "negative" evaluation was expressed in the actual topic name, i.e., */Rh-negative Blood/* the initials are not reversed.

[10.2.] *Inversion Operations*. Inversions in narratives, in which something is converted to its opposite, are operations performed to express disagreement.

Instantiation. In a narrative about the */9:1 Ratio of Hyperactive Males to Females/* a discussant noted that the ratio of 9 males to 1 female was the same ratio as the gender composition in the group. Although the 9:1 ratio was correct, the actual gender composition was the reverse (9 females to 1 male). In response, the original discussant described a work situation in which */The Signs on the Restroom Doors Were Switched/* indicating sub-literal disagreement with the previous discussant's observation that the ratio of 9:1 was the same as in the discussion (switching the signs of the restroom door is equivalent to changing the signs on an algebraic equation from + to -).

[10.3.] *Opposition Operations*. Narratives presented as paired opposites are cognitive operations that express differences among discussants.

Instantiation. An affective sub-literal schema regarding dominant versus non dominant discussants is expressed by the opposition of topics like */Giants versus Dwarfs/* or */Parents versus Children/* etc.

[10.4.] *Rules for Reversal Operations*. Two consistent rules govern the reversal of initials.

Instantiation. (1) When a narrative expresses something positive or neutral, and the sub-literal meaning refers to a person in a discussion who is viewed positively, initials are not reversed because the positive attribution toward the person is expressed in the story or topic context, or when the negativity (a) is directly expressed in the topic as in */Rh-negative Blood/* or (b) when the general context of the story expresses negativity; thus conversely, (2) when a narrative expresses something neutral and the sub-literal reference is to a person in the conversation who is viewed negatively, then the initials are reversed in order to express the negative attribution, e.g., *Harold Robbins* ([7.] *Nominal Semantic Operations*).

[11.] *Memorial and Cognitive Psycho-dynamic Operations*

[11.1.] *Memorial and Perceptual Reconstruction Operations*. These occur to render the content and structure of narratives correspondent with the $S_{ub}L_{it}$ referents to which they refer.

Instantiation. A reference to a journalist /Harry Harris/ was mis-remembered or reconstructed. The discussant later reported that the intended name was Sidney Harris a well-known columnist. This is a cognitive psycho-dynamic "mistake" in that it enabled a series of sub-literal referents to be expressed that would not have been possible had the correct name been used (see [8.1.3.] *Phonetic Operations*, [8.2.] *Syntactic Ordering Operations*).

[12.] Arithmetic Operations

[12.1.] *Numeric Representation Operations.* Numbers selected into a narrative can serve as $S_{ub}L_{it}$ numeric references to subgroups within the narrative situation.

Instantiation. The numbers /6/ and /4/ selected into a narrative correspond to two factions or subgroups of 6 and 4 in the narrative situation. The veridicality is further indicted by numeric recomputation.

[12.1.2.] *Numeric Recomputation Operations.* Numbers selected into narratives that correspond to subgroups within the total narrative situation consistently change with group membership.

Instantiation. Narrative numbers that correspond to a subgroup of 6 such as /6 People Were Standing/ or /6 Cars Were Parked/ are changed in subsequent permuted narratives to numeric references involving, for example /5 Drinks/ and /5 Doors Down/ when one discussant of the original subgroup of 6 is absent.

[12.1.3.] *Systemic Numeric Recomputation Operations.* Numeric representations selected into a narrative that are $S_{ub}L_{it}$ references to subgroups within the actual narrative situation and their recomputations are consistently found in transformational and permutational narratives.

Instantiation. The above ([12.1.2.]) numeric recomputations will be consistently found in all other transformations and permutations of the original narrative.

[12.1.4.] *Numeric Approximation Operations.* Numeric references that are $S_{ub}L_{it}$ referents to the narrative situation are often stated as approximations. This is done for two reasons: first, because an exact reference would not fit the intended $S_{ub}L_{it}$ referent if it is precisely referenced, and second, to indicate two different referents simultaneously.

Instantiation. In a narrative, it was said to be /About/ 10 or 11, or /Something Like That/. The adverb /About/ and the phrase /Something Like That/ make it possible to reference simultaneously both subgroups: the 10 younger discussants would total 11 if the older woman was included (consistent with [11.1.] *Memorial and Perceptual Reconstruction Operations*).

[12.2.] *Cipher Operations*. Zeros (beyond those used in the number 10) do not function computationally (beyond the number representing the actual size of the discussion membership) though they may function representationally, i.e., 300 does not mean "300" (see [13.] *Logico-mathematic Representation Operations*).

Instantiation. A number /10,000/ is selected into a narrative. The first two digits, /10 (000)/ sub-literally represent the 10 discussants with the last three digits /000/ representing a subgroup of 3 (zeros may also function as dual, double, or complex numbers (see [13.6.] *Logically Complex Number Operations*). Zeros also can function as a "1" as in addition, e.g., $2 + 0 = 3$.

[12.3.] *Cancellation Operations*. Double numbers, e.g., 88, 11, 66, etc. may cancel to a single number, e.g., 8, 1, 6 (the validity of this operation is provisional).

Instantiation. The number /44/ is selected for discussion to represent a subgroup of 4 that was dominant.

[12.4.] *Single Number Operations*. Double numbers, e.g., 44, or dual numbers, e.g., 51, may function as two single numbers.

Instantiation. The dual number expressed in /21 Years Old/ is selected for a discussion to represent a triadic subgroup where the /2/ stands for the 2 male discussants and the /1/ stands for the 1 female discussant (see [13.] *Logico-mathematic Representation Operations*).

[12.5.] *Addition Operations*. Double or dual numbers selected for a discussion may add together to equal a sum.

Instantiation. The dual number expressed in /21 Years Old/ is selected for a discussion to represent the leadership subgroup of 3, composed of 2 males and 1 female. The dual number first functions as two single numbers and sums to 3, i.e., $2 + 1 = 3$.

[12.6.] *Subtraction Operations*. Subtraction does not occur as a standard $S_{ub}L_{it}$ arithmetic operation; it occurs by using cancellation operations or by using ciphers.

Instantiation. The number /10,000/ is selected for a narrative to represent the 10 discussants who are present out of a total of 13, including the researcher/trainer. The 3 zeros represent the 3 missing discussants as well as, when added to 10 (i.e., $10 + 0 + 0 + 0$) represents the 13 discussants present (consistent with [12.2.] *Cypher Operations*).

[12.7.] *Multiplication Operations*. Arithmetic division operations do not occur. Multiplication operations only occur as a variant of addition operations, that is, by the simple repetition of numbers (see above).

[12.8.] *Double References.* In matching and mapping, double references may be involved. A double reference is a narrative that applies to two separate referents simultaneously.

Instantiation. A narrative about being */Under 21 Years of Age/* may refer to (a) the younger participants in a discussion who in fact are *under*, i.e., younger than, *21 years of age* and (b) *3 dominant discussants* involved, i.e., $2 + 1 = 3$ (see [12.4.] *Single Number Operations*, [12.5.] *Addition Operations*).

[12.9.] *Single-aspect Numeric Change Operations.* A given number may, at one time, include a discussant and at another time exclude the same discussant. This variation is dependent on the affective schema and context at a given point.

Instantiation. When an affective schema is about a triadic leadership structure, the complex number in the topic about the temperature being */110 Degrees/* includes the male researcher/trainer as indicated by the 1s in */110/* representing the *2 males* (one of which is the researcher/trainer) and the zero in the */110/* representing the *1 female*. When the */110/* totals the entire group, i.e., $11 + 0 = 12$, it excludes the male researcher/trainer, because only the peer membership is working toward a college "degree" (see [13.] *Logico-mathematical Representation Operations*).

[13.] *Logico-mathematic Representation Operations*

[13.1.] *Binary Coding Operations.* Logical and categorical distinctions may be performed by numeric coding similar to computer binary codes in which various combinations of 1 and 0 are used to delineate categories.

Instantiation. The number */110 Degrees/* is selected into a narrative to logically distinguish the compositional structure of a subgroup. The two 1s in the */11(0)/* equate to 2 particular discussants in a triad, with the */0/* equating to the third discussant (a female, see [13.6.] *Logically Complex Number Operations*).

[13.2.] *Category Structuring Operations.* Physical separation between numbers distinguishes $S_{ub}L_{it}$ referent categories.

Instantiation. In a previous instantiation ([12.2.] *Cipher Operations*), where the number */10,000/* is selected for a discussion to represent 2 subgroups, the comma structurally marks the separation between a group of 2 (or 10), and a group of 3, i.e., the three zeros.

[13.3.] *Gender Category Operations.* Numbers are used to distinguish gender categorically.

Instantiation. In the numeric topic of */110 Degrees/* ([13.1.] *Binary Coding Operations*), the 1s in */11/* are used to represent 2 males in a subgroup of 3, with the */0/* representing the third discussant who is a female.

[13.4.] *Relative Category Operations.* Numbers used to represent gender categories are relative, not fixed values.

Instantiation. In the previous instantiation, males are represented in the /110 Degrees/ by the /11/ and the female by the /0/ whereas in the instantiation using the topic /21 Years Old/ the males are represented by the /2/ and female by the /1/. Sub-literal categories are constructed relationally, not in absolute attributes.

[13.5.] *Inclusivity and Exclusivity of Categorical Set Operations.* Categorical boundaries that are inclusive on a literal level may be both exclusive and inclusive on other $S_{ub}L_{it}$ levels.

Instantiation. From a literal perspective, a statement about /3 of the 10/ people in a bar is an inclusive set, with the /3/ being a subset of the larger set /10/. However, sub-literally the /3 of the 10 People/ constitutes two exclusive sets of 3 and 10, which by the operation of addition, references the total group membership of 13, i.e., $10 + 3 = 13$.

[13.6.] *Logically Complex Number Operations.* A numerically simple number can be a complex $S_{ub}L_{it}$ cognitive operation that represents multiple categories.

Instantiation. The complex number in a narrative about a temperature of /110 Degrees/ which is a literal reference to the temperature at the top of /3 Warehouses/ references the multiple subsets of 3 dominant discussants in a narrative situation. The number /110/ by adding the $1+1+0$ sums to 3, the complete triadic structure (see [12.2.] *Cipher Operations*). Through category structuring, gender category operations, and relative category operations, the complex numbers distinguish subgroups within the triad: the two /1s/ stand for the 2 males, the /0/ for the older female, the $1 + 1 + 0$ represent the older male + a younger male + older female (who are perceived as a "couple" or pair). The number /110/ distinguishes multiple sub-groups within the total group: $1 + 10$, where the /1/ stands for the 1 male; the /10/ for the 10 young females; $11 + 0$ is the total number of females (including the older female) + the male (now represented by a 0) totaling 12, the entire group. The researcher/trainer is not included in this aspect of the total count because contextually the narrative of /110 Degrees/ was a sub-literal reference to obtaining a college degree and thus would not include the researcher/trainer ([2.] *Contextual Procedures*).

[14.] *Matrix and Lattice Structure Validation Operations*

[14.1.] *Matrix Structure Operations.* In analyzing and validating the cognitive structure of a set of narratives, the various aspects of the narratives from which $S_{ub}L_{it}$ meanings are partially derived can be assigned to cells within an isomorphic cognitive matrix notated as M_0 (Haskell, 1982).

Instantiation. This is illustrated by Figures, 1, 2, 4, 5, where each illustrates the matrix structure.

[14.2.] *Lattice Structure Operations.* A lattice structure is composed of the base matrix (M_0) and a series of transformational matrices ($M_1, M_2,$

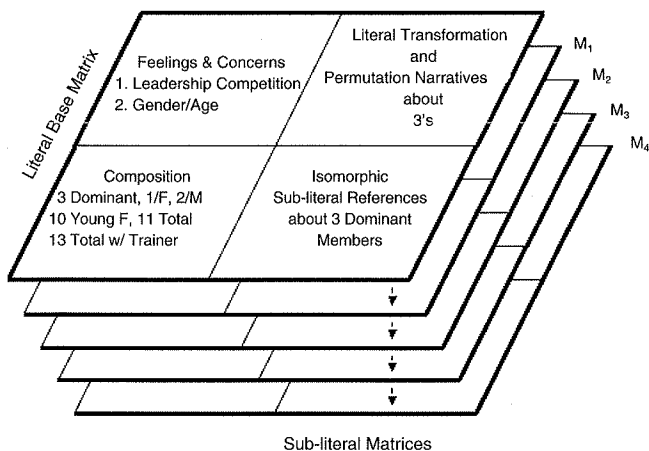


Figure 6: Collapsed lattice matrix.

M_3, M_4), the cells of which contain the different levels of $S_{ub}L_{it}$ material that structurally correspond to the cells in the generative base or literal matrix. Each tier can be seen as an harmonic or higher-level expression of the basic matrix.

Instantiation. Since all topics are transformations or permutations of a single basic affective schema, they can be extended into a lattice-like series of matrices, or collapsed into a single set or group (see Figure 6).

[15.] Multicorrelative Transformational Validation Operations

[15.1.] *Internal Order Structure Operations.* In part, validity and falsification of $S_{ub}L_{it}$ referents are established by operations similar to establishing mathematical proofs, that is, internal correspondences are deductive or derived transformations, correlations, and relationships, which constitute the structure of an ordered series based on cognitive operations and on rules of inference.

Instantiation. See [3.] *Transformational, Permutational, and Transitional Operations*, [13.] *Logico-mathematic Representation Operations*.

[15.2.] *External Order Structure Operations.* Unlike with mathematical proofs, establishing the validity and falsification of $S_{ub}L_{it}$ narratives requires external structures that correspond to the narrative situation. Without external correspondence, the mathematic-like internal order does not refer to any empirical reality.

Instantiation. All numeric references which are found to be internally consistent across the various transformations and permutations, and which are integral with other numeric references ([15.4.] *Dimensional Tracking of Deductive Subset Invariance Operations*) must map onto corresponding empirical realities in the narrative situation.

[15.3.] *Intra- and Inter-narrative Multicorrelative Structure Operations.* Narratives generated from a given affective schema as well as from among different affective schemata across different narrative sessions will consistently use the various cognitive operations.

Instantiation. Transformational and permutational, as well as deductive subsets of both intra- and inter-narrative topics will appropriately exhibit consistent semantic ([7.] *Nominal Semantic Operations*), associational ([5.] *Associational and Dimensional Operations*, evaluative ([5.2.] *Dimensional Evaluative Vector Operations*), resonance ([4.1.] *Resonance Operations*), sociometric ([4.2.] *Sociometric Operations*), gender ([13.3.] *Gender Category Operations*), noun and pronoun shifts ([9.1.1.] *Pronoun Shift Operations*, [9.2.] *Noun Shift Operations*), temporal shifts ([9.1.] *Temporal Shift Operations*), reversals ([10.] *Reversal, Inversion, Opposition Operations*), psychomotor ([6.] *Parallel Psychomotor Operations*), numeric ([12.1.] *Numeric Representation Operations*), and dimensional tracking operations ([15.4.] *Dimensional Tracking of Deductive Subset Invariance Operations*).

[15.4.] *Dimensional Tracking of Deductive Subset Invariance Operations.* Logically, if a narrative is consistently associated with a given dimensional vector (see [5.] *Associational and Dimensional Operations*) such as /Down/ or /Left/ then it follows that all $S_{ub}L_{it}$ subsets, transformations, or permutations of the topic should also be consistently associated with those vectors.

Instantiation. In sub-literally referencing a dominant triad, the narrative about /110 Degrees/ is selected (1s = males; 0s = females). The subsets of the triad are 2 males and 1 older female. Thus, in addition to a dimensional association to the /110/, references to subsets are also equivalently associated in terms of their dimensional tracking, i.e., other references to 2s and 1s are /down/ and /left/. These take the form of "if-then" statements i.e., if all X is associated with Y, then X' should be associated with Y' (see [13.] *Logico-mathematic Representation Operations*).

[15.5.] *Dimensional Tracking of Transformational and Permutational Invariance Operations.* Logically, if a narrative is consistently associated with a dimensional vector such as /Down/, /Left/ etc., then it follows that any permutation or transformation of the topic should also be consistently associated with the same vectors.

Instantiation. In sub-literal references to a dominant triad, the two permutations of /110 Degrees/ and of being /21 Years of Age/ and /3 Warehouses/ (see [3.2.] *Permutational Operations*, [13.6.] *Logically Complex Number Operations*) are consistently associated with the dimensions of /down/ and /left/ (by non members of the triad ([2.2.] *Developmental Stage*, [4.] *Psycho-sociometric Operations*)).

[15.6.] *Cross-session Tracking of Transformational and Permutational Invariance Operations*. In terms of a systemic validation, if a series of semantic or numeric narratives within a session consistently exhibits structures and $S_{ub}L_{it}$ characteristics then the transformations and permutations of *previous sessions* should also consistently exhibit the same characteristics.

Instantiation. References to 3s in previous sessions will all be dimensionally congruent with [15.] *Multicorrelative Transformational Validation Operations*.

[16.] *General Validation Considerations* (the following are treated within the main text above; see pp. 370–373).

[16.1.] *Levels of Analysis and Validation*

[16.2.] *Nomological Validation Network*

[16.3.] *Falsification*

[16.4.] *Retrodiction and Prediction*