

# **PERSONALITY AND LANGUAGE BEHAVIOR: A RESTATEMENT<sup>1</sup>**

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This restatement of the theoretical framework underlying the research program of the University of Michigan Personality and Language Behavior Research Group addresses two theoretical issues that are at present particularly relevant to a theory of second language acquisition: the status of constructs in the theory that have been transported or transposed from other fields, and the process (and criteria) of theory validation. Defining and assessing the value of "borrowed" constructs is of course a serious concern of any interdisciplinary, applied science. Once that has been accomplished to satisfaction, however, the even more imposing task remains of testing the fit of those constructs within the larger context, in this case, a general theory of second language acquisition. Using as an example the development of the language ego paradigm (Guiora 1972), we first assess the moorings of its theoretical constructs in psychology and linguistics. We then examine the nature of the empirical evidence and argumentation that bears on its validity.

It was in 1966 that we first drew attention to the desirability and possible fruitfulness of "collaborative research between the discipline of clinical psychology and the language sciences," an interaction that up to that point had been almost non-existent (Guiora et al. 1968:261). The initial impetus came from our frustration with the built-in limitations of clinical research, specifically the inadequacy of attempts to study constructs such as empathy, intuition, and the like. It was out of this context that "transpositional research" as a research strategy emerged (Guiora 1967), launching The University of Michigan Personality and Language Behavior Research Group<sup>2</sup> on a pursuit that continues to this very day.

At first, our involvement with language behavior was secondary to clinical interests. As it often happens however, research has its own momentum, and before long, we were fully immersed in a systematic study of the inter-relationship between personality parameters and

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language behavior. It is only now, twelve years later, that we are completing the circle and are on our way back to clinical concerns.

This interdisciplinary effort has indeed been most fruitful. A cluster of concepts, themselves extensions of and extrapolation from certain psychoanalytic ego psychological theoretical constructs, was developed, namely: language ego, language ego boundaries and permeability language ego boundaries (Guiora 1972). The set of concepts which have served as both mediating concept and heuristic paradigm for much of our research has attracted considerable attention in the literature (cf. Brown 1973, Romano 1973, Taylor 1974, Schumann 1975, Upshur 1975, Stevick 1976, Brown, in press, Oller, in press) and in the media.

Gratifying as this may be—on one level—the occasional apparent misunderstandings of our work in some cases, would in themselves be enough to warrant clarification. Of course, the possibility that one's theoretical constructs may not be universally understood and correctly interpreted is an occupational hazard of any scientific endeavor. In applied, inter-disciplinary, transpositional research such as ours it is even more problematic.

There is, however, a more important reason for the following restatement of the basic theory we have been developing over the course of the last twelve years. The issue is not simply the place of language ego in the theory of second language acquisition. The problem we would like to address is a fundamental concern of the philosophy of science: the process of theory validation.

On what grounds are we (as students of second language acquisition, for instance) to decide whether a theory has been supported by a given study? On what grounds do we assess the significance of anomalies to that theory? These are issues particularly relevant in a field such as ours that has experienced such rapid growth during the last several years. The rapidity with which theories and paradigms have been coming and going in both linguistics and applied linguistics is, by any standard, mindboggling.

We seem, in Kuhn's (1970) terms, to be in a pre-paradigm period where there are several competing models of language learning, language teaching, and language itself. It is clear that many of our old paradigms have been discarded, but their successors are at this point not clearly in view.

Our intent here is to "kill three birds" with one argument. After again carefully defining the three basic constructs of our theory, we will argue for the construct validity of that theory while at the same time discussing the important epistemological issues involved in such argumentation. Using our work as an example, we will attempt to

demonstrate that the relationship between a construct and its validation is to a great extent a matter of cumulative evidence.

Before proceeding any further, it might be useful at this juncture to recall the origins of "transpositional research strategy"—the starting point of our efforts.

A frequently encountered problem in clinical research involves the difficulties of operationalizing and measuring personality constructs in general. Recognizing the inherent "limitations of reductionist and analogue research strategies that are usually offered to alleviate the situation described above, we abandoned attempts to achieve better operationalizations. Instead, we tried to identify another realm of behavior where the phenomena first observed in the clinical situation could be assumed also to exist. This other realm of behavior, however, unlike the original clinical circumstance, would be such as to lend itself readily to the manipulation of variables and populations—to rigorous empirical research. We called this strategy transpositional research" (Guiora 1970).

### Language and Personality

What then were the questions to which we sought answers? In simple terms, the question has been: how will language affect personality development and how will personality development, in turn, affect language behavior. We must caution the reader at this point that the problem so posited was not a simple rephrasing of the so-called Sapir-Whorf hypothesis. According to Carroll (Whorf 1956:26) "Whorf appeared to believe, indeed, that the *content* of thought influences the *process* of thought, or that different contents produce differing species of processes, so that generalization about process becomes impossible without content's being taken into account (*italics ours*). As it has been noted elsewhere (Guiora and Sagi 1978)" . . . this line of reasoning leads of course to what has become known as the principle of linguistic relativity, which states—again, in the words of Carroll—"at least as a hypothesis, that the structure of a human being's language influences the manner in which he understands reality and behaves with respect to it" (Whorf 1956:23). Bold and imaginative as the proposition is, it runs the risk of being overstated and oversimplified. Clearly the interaction between language, culture, and personality development is much more complex and much more differentiated than a structural-relativistic theory would predict. This point deserves some elaboration. While the Whorfian proposition addresses only the question of the possible impact the structure of language has on behavior, our efforts

aimed at the *reciprocal* relationship between language and personality development.

### **Impact of language on personality**

On the "Whorfian" side of the issue our various gender-related studies sought to provide an empirical test of the relationship between native language and self-representation. The first study addressed the question of the relationship between grammatical gender and "gender loading" in the native language (a linguistic construct) on the one hand, and the development of gender identity (a psychological construct) on the other (Beit-Hallahmi et al. 1974). In that study the question raised was "how will differences in gender loading of words affect the perceptions of reality in different cultures? In particular, what is the impact—if any—of varying degree of linguistic gender loading on the development of gender identity in the growing child. Empirically, the question was: will there be a correlation between the amount of linguistic emphasis on sex-determined gender and the average age of attaining gender identity in children, in a specific linguistic environment." We decided to compare, on an instrument developed for this purpose, toddlers in Israel (Hebrew has maximum gender loading) in the United States (English has minimum gender loading, and in Finland (Finnish has zero gender loading). comparison of the data from Israel and the United States shows quite impressively that Israeli children do indeed have a significant though temporary development edge over their American counterparts (Guiora et al. 1975). In other words, we find that Hebrew speaking children are more successful on the Michigan Gender Identity Test (MIGIT) *at an earlier age* than are American children. Testing in Finland has just been completed, and should the data show that Finnish speaking children lag *behind* Hebrew speaking children, serious thought will have to be given to the proposition that the structure of native language has an influence on personality development.<sup>3</sup>

In a corollary inquiry we asked whether grammatical gender in one's native language influences the way in which male or female characteristics are assigned to essentially asexual objects. In other words, would structural elements of the native language influence the assignment of meaning, or perhaps it would be the other way around,

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<sup>3</sup>We have just now, after completion of this paper, received word from Finland that significant differences were found between the performance of Israeli and Finnish children. The differences were in the predicted direction, and they cluster around the same developmental transition point as previously noted. The significance of the findings is self-evident, and we shall report them in full in the immediate future.

and connotative meaning would be free of the particular constraints imposed by the structure of the native language (Guiora et al., in press, Guiora and Sagi 1978). A Semantic Differential Test was constructed, composed of one scale only: masculine-feminine. The importance of this semantic differential test was perhaps mainly in the way the stimulus words were chosen. There were thirty stimulus words, arranged in three pairs of sets, termed Neutral, Consonant, and Dissonant. Each set had the English equivalent of five masculine (in Hebrew) and five feminine (in Hebrew) nouns. Three sets of ten words in all. The Neutral set was composed of names of objects with presumably minimal or zero sexual connotation. The Consonant set was composed of words whose grammatical gender, again in Hebrew, seemed to be positively related to their assumed sexual connotation. Finally, the Dissonant set was composed of words whose grammatical gender, again in Hebrew, seemed to be at variance with their assumed sexual connotation.

The overall conclusion that emerged was that Israeli college students seemed not to be influenced by the grammatical gender, and ascribed sexual connotation to the test-words in a manner identical to American students.

As an extension of this study we raised the question, this time from a developmental perspective, whether our findings were age-related. Adults appear not to be influenced by the constant exposure to gender markings and their assumed residual associative influence, but assign meaning to words as if they represented cultural universals. The question was how soon is acquired this capacity to "resolve" seemingly conflicting information in favor of meaning, as opposed to structure, Nadelman (1970) has shown that both boys and girls have "high knowledge" of sex-typing by five years of age. For this reason it was this age group that we decided to compare with adults.

Twenty-three Israeli kindergarteners and sixteen Israeli college students were tested. The kindergarteners group was composed of 12 boys and 11 girls, while the adult group of 6 males and 10 females. Hebrew was the native language of all subjects. The result demonstrated that Israeli college students were not influenced by the prevalence of grammatical gender in Hebrew, but ascribed sexual meaning to the test words, based on their assumed connotative values. Thus this replication seems to confirm the first study. Further, the findings offered clear evidence that five-year old Israeli children will be guided by the assumed sexual connotation of the words denoting them, and not by their grammatical gender. In this regard they behave like adults. Whatever the cognitive processes underlying the development of the capacity to resolve seemingly conflicting information in

favor of the more salient feature, in this case, *meaning*, they seem to be in place by the time the child reaches five years of age.

### **Impact of personality on language**

It has been our basic assumption that language is a unique phenomenon in the sense that it is both intensely personal even idiosyncratic in its physical representation and at the same time species specific. As such, it serves as a bridge between the individual and the species, offering a rare opportunity to study one, and extrapolate to the other. Moreover, language and speech are recordable, retrievable, manipulable, analyzable, in short researchable in ways that other kinds of behavioral data, let alone psychological constructs, are not.

Language and speech incorporate in a unique blend intra- and interpersonal parameters, cognitive and affective aspects of information processing, allowing a view of the total person in a manifestation that lends itself to scientific inquiry. In other words, a great deal of information rides on language behavior, perhaps analogous to the way blood is the carrier of vast amounts of information about bodily functions.

Almost from the beginning, the language behavior that seemed to be most singular and baffling to us (outside of language acquisition itself) was the apparent ease with which young children are able to assimilate authentic pronunciation in a foreign language, in its native environment, and the equally apparent inability of almost all people, past the magic barrier of 10-12 years of age, to assimilate authentic pronunciation in a foreign language under almost any circumstances.

We have suggested that the best approach for the study of these phenomena is a three pronged strategy. The "...study of the approximation of native-like pronunciation in a second language (should be pursued) in three different dimensions: as developmental stages, as stable differences in adults, and as experimentally induced behaviors" (Guiora 1972).

### **The Constructs: Language Ego, Language Ego Boundaries and Premeability of Language Ego Boundaries**

The three basic constructs, first articulated by Guiora (1972), are summarized in Guiora et al. (1975). "The choice of authenticity of pronunciation as the realm of behavior for testing hypotheses about empathic capacity was based on the notion that both pronunciation ability and empathy are profoundly influenced by the same underlying

processes, namely permeability of ego boundaries. In order to sharpen the conceptual focus, a mediating construct, *language ego*, was introduced. Like the concept of body ego, language ego is a maturational concept and likewise refers to self-representation with physical outlines and firm boundaries." (Guiora 1972).

The notion of boundaries is important. In the formative stages of development there is a state of flux: boundaries are more flexible, more easily permeated. Once ego development is concluded this flexibility is sharply restricted and there will be marked individual differences later in the range of flexibility or plasticity of ego boundaries.

The implications of this for second language learning are clear. Pronunciation is viewed as the most important contribution of language ego to self-representation. The early flexibility of ego boundaries is reflected in the ease of assimilating native-like pronunciation by young children; the later reduced flexibility is reflected in the reduction of this ability in adults. . . (empathy and pronunciation). . . both require a temporary relaxation of ego boundaries and thus a temporary modification of self-representation" (Guiora et al. 1976).

Even though empathy is unquestionably a high level construct and most difficult to measure, we moved even beyond empathy, in reaching for a "higher" construct in the permeability of language ego paradigm. What needs to be kept in mind is that we introduced a mediating concept, language ego, which serves as the psychological underpinning of a variety of language behaviors, one which we believe has the greatest inherent explanatory power. The most common misreading of our basic theoretical framework has been the notion that permeable ego boundaries are somehow related to a "weak" ego and attenuated sense of self, and, conversely, that strong or clear ego boundaries are antithetical to empathy. Nothing could be further from the truth.

To understand what aspects of personality are being referred to in the notion of permeability of language ego boundaries, one must first understand the idea of "ego" and the function of the "boundaries" discussed above. In essence, a healthy "ego", if one may speak of such terms, is one that is clearly defined. The boundaries as to what the person is, and is not, are relatively unambiguous. The concept of "permeability of language ego boundaries" suggests the ability to move back and forth between languages and the "personalities" that seem to come with them. This is related to the common observation that one "feels like a different person" when speaking a second language and often indeed acts very differently as well. To have permeable ego boundaries entails having a well defined, secure, integrated ego or sense of self in the first place.

### **Cumulative validation of the language ego paradigm**

In the development of any theory there are a number of necessary steps or phases that must take place before the theory and its constructs are accepted as validated. In this section we will discuss four of those phases as they relate to the evolution of the language ego paradigm: 1) initial establishment of the construct validity by empirical means, 2) the consideration of anomalies and non-anomalies to the theory, 3) the reinforcement of the construct validity of the paradigm through related empirical studies (or replications), 4) the reinforcement of the paradigm through its use in explaining related phenomena.

Our earliest attempts to study the relationship between empathy and the ability to pronounce a foreign language provide an excellent example of the value of replication and the status of anomalies in a theory. These studies used as a measure of the independent variable the so-called Micromentary Expression (MME) test. Because of its centrality in the phase of our work and the considerable controversy it has aroused in the literature, it is perhaps useful to briefly review the test here.

The technique was first described by Haggard and Isaacs (1966) and it involves showing a silent motion picture of a woman conversing. It was discovered that when shown at slower than normal speeds facial expressions of intense feelings, unobservable at higher speeds, are seen. The measure developed from this technique is based on the proposition that a subject's ability to identify changes in facial expression at various speeds taps his sensitivity to the affective states of another, or his empathic capacity. While empathy is, of course, correct perception and understanding of the affective or emotional state, the methodological problems of naming emotions correctly would have added unnecessary complexities (Carney 1929, Osgood 1966). The measure proposed was by necessity, several steps removed from being a direct measure of the empathic process.

The MME test of empathy as ultimately developed by us consisted of three 30 second sequences of film, selected for this project, of a woman in an interview. Only the head and shoulders of the woman were observable so that body cues were reduced to a minimum. The subjects saw the first two film segments repeated at the normal speed of 24 frames per second, at 16 frames per second, 12 frames per second and 4 frames per second. These were considered practice or trial runs. The third segment, the test, was shown twice at 24 frames per second to measure re-test reliability and at 12 and 4 frames per second.

The subjects instructions to indicate each change in facial expres-



sion they saw by pressing the button of a signal box on the table before them. Their response was recorded on the timed output sheet of a 20 channel Angus-Esterline chronograph, one channel of which marked each second while another indicated when the film sequence began and ended. This precise record allowed for tabulating only the number of responses made, but scoring the accuracy of those responses according to an independently established pattern of facial changes. This criterion of accuracy was determined by asking four psychology graduate students to sort the 728 pictures printed from the test film into piles, beginning a new pile when there was a change in facial expression. The four judges agreed, within three frames, on 52 changes. The time of these changes was determined for the various speeds. Superimposing this pattern of correct changes on the subject's record, with a minor adjustment for reaction time, provided a way to score correct responses" (Taylor et al. 1972).

Initial results from two studies using the MME had seemed to directly support our hypothesis. Encouraged, we then went on to design several other experiments using this instrument. Much to our dismay, with further use of the MME it became evident that the MME was, in fact, rather unreliable. We have since actively discouraged its use. The fact that the reliability of the MME has been called into question, essentially after the constructs has been to a great extent validated in other studies, is most interesting. How does the status of the MME reflect upon the theory in that case? First, one major problem with the MME is the cumbersome, unwieldy instrumentation required. Even if the task of observing changes in facial expression and pushing a button to signal recognition of those changes taps into empathic abilities, the mechanics of it are very difficult to deal with. Second, the fact that the MME did hold up in initial experiments and that there is a good deal of intuitive appeal to the task itself should not be discounted. The apparent success of the early pronunciation studies led to the construction of the now well-known "alcohol study" (Guiora et al. 1972). The purpose of the study was to examine the effects of a small amount of alcohol on the ability of college students to pronounce words and phrases in a foreign and totally unknown language (Thai). We hypothesized that the effect would be an improvement in the ability to approximate authentic pronunciation as compared to a control group who would not consume alcohol (but a placebo designed to simulate alcohol). Eighty-seven University of Michigan students served as subjects. All were over 21 years of age and were informed in advance only that the experiment would involve responses to alcoholic beverage. The results of this study are highly illuminating. The hypothesis that the experimentally induced lowering of inhibitions or

enhancing of the permeability of ego boundaries will lead to a corresponding enhancement of the pronunciation flexibility was conclusively confirmed.

This finding is all the more interesting in light of the fact that overall mental functioning, (cognitive, psychomotor, memory, i.e. integrated ego functioning) as measured by the Digit Symbol Test was adversely affected by the same condition. In other words, pronunciation permeability is apparently critically influenced by a psychological variable that can be successfully isolated out of the total web of ego functioning (Guiora et al. 1972).

In a recent study, Schumann et al. (1978) following Guiora's suggestion (Guiora 1972), tested the hypothesis that "improvement in pronunciation ability will be greater for high hypnotizable than for low hypnotizable subjects." They report that "when groups were defined in terms of their own ratings, deeply hypnotized subjects performed significantly better than less hypnotized subjects" and conclude that "the results are consistent with both Guiora's line of reasoning about permeability of ego boundaries and Hilgard's neo-dissociation theory." The hypnosis study represents an impressive piece of cumulative validity to the paradigm. It represents a confirmation of the basic concept of permeability of language ego boundaries, with the important addition that the main effect is not, chemically induced, but seems to be related to "hypnotizability."

The explanatory value of a paradigm, to some degree independent of its empirical validation, provides another important and crucial source of cumulative validation. Acton (1978, 1979) in attempting to explain why certain learners may be better at perceiving the connotations of words in the target culture notes that the "empathic" learner has an advantage in at least two ways. First, that type of learner is better at picking up the nuances of word use being able to "put himself inside another's head." Perhaps more importantly, if we assume that the connotation of words is best picked up in conversation, in face to face interaction, then the empathic person in part because of his potential for more accurate pronunciation should find it easier to engage in meaningful, more sophisticated conversation. The learning of those connotative meanings is then further enhanced. In Acton study the paradigm provides a key link between conversation and perception of lexical connotation.

### **Studies in progress to further scrutinize the validity of the paradigm**

At this point in time there still remain some important questions relating to the validity of the paradigm. Several studies are currently

underway to answer those questions. Brown (1973) pointed out that the results of the alcohol study might be explained in part by the muscle relaxing effect of alcohol—not necessarily by the relaxing of inhibitions. It is of course arguable if one could “relax” one without relaxing the other. However, in order to deal with that issue conclusively a replication of the alcohol study was undertaken, this time using Valium instead of alcohol. Valium acts quite differently on the nervous system than does alcohol yet the expectation is that it will yield the same main effect. i.e. improved performance on the pronunciation measure.

One claim that we have made, if only implicitly, is that performance on the Thai pronunciation test (STP) reflects the same “mental set” necessary to accurately pronounce a second language. That hypothesis has been recently put to the test (test results of this study will also be ready in the near future). Subjects in their first year of college French were given both the STP and a test of French pronunciation, the hypothesis being that the STP should predict ability to pronounce French. It was stated earlier that we have “completed the circle” and have returned to clinical concerns. In yet another ongoing study we have begun to use the paradigm (and the STP) in attempting to predict performance of psychoterapists in training.

Our original motivation was to study empathy by “transposing” it into an area where it could be studied more effectively. If our current studies further validate the theory and the power of the STP to indicate certain “empathic” qualities, then the search for an instrument to measure the desirable qualities of psychotherapists will have been advanced.

Finally, it may be well to consider that for the language ego paradigm (and any theory for that matter) its ultimate validity can only be seen in light of the total research program of which it is a part and its usefulness in generating new hypotheses and explanations.

## REFERENCES

- Acton, W. 1978. Three sources of variance in L2 “attitude” measures. Paper presented at the AAAL meeting, December 1978, Boston.
- Acton, W. 1979. Perception of lexical connotation in second language acquisition. Unpublished doctoral dissertation. The University of Michigan.
- Beit-Hallahmi, B., J. C. Catford, R. E. Cooley, C. Y. Dull, A. Z. Guiora, and M. Paluszny. 1974. Grammatical gender and gender identity development: cross-cultural and cross-lingual implications. *American Journal of Orthopsychiatry* 44.3.
- Brown, H. D. 1973. Affective variables in second language acquisition. *Language Learning* 23.2.
- Brown, H. D. In press. *Principles of Foreign Language Learning and Teaching*. Englewood Cliffs: Prentice Hall.

- Carney, L. 1929. The interpretation of facial expression in emotion. *Journal of General Psychology* 2.59.
- Guiora, A. Z. 1967. Toward a systematic study of empathy. *Comprehensive Psychiatry* 8.5.
- Guiora, A. Z. 1970. Transpositional research in the clinical process. *Comprehensive Psychiatry* 11.6.
- Guiora, A. Z. 1972. Construct validity and transpositional research, toward an empirical study of psychoanalytic concepts. *Comprehensive Psychiatry* 13.2.
- Guiora, A. Z., H. L. Lane, and L. A. Bosworth. 1968. An exploration of some personality variables in authentic pronunciation of a second language. In *Proceedings of the Conference on Language Behavior*, Eric M. Zale, (ed.), New York: Appleton-Century-Crofts.
- Guiora, A. Z., R. C. L. Brannon, and C. Y. Dull. 1972b. Empathy and second language learning. *Language Learning* 22.1.
- Guiora, A. Z., B. Beit-Hallahmi, R. C. L. Brannon, C. Y. Dull, and T. Scovel. 1972. The effects of experimentally induced changes in ego states on pronunciation ability in a second language: an exploratory study. *Comprehensive Psychiatry* 13.5.
- Guiora, A. Z., M. Paluszny, B. Beit-Hallahmi, J. C. Catford, R. E. Cooley, and C. Y. Dull. 1975. Language and person, studies in language behavior. *Language Learning* 25.1.
- Guiora, A. Z., B. Beit-Hallahmi, and A. Sagi. In press. A cross-cultural study of symbolic meaning. *Applied Linguistics*, in press.
- Guiora, A. Z., A. Sagi. 1978. A cross-cultural study of symbolic meaning - developmental aspects. *Language Learning* 28.2.
- Haggard, L. A., R. S. Isaacs. 1966. Micromomentary facial expressions as indicators of ego mechanisms in psychotherapy. In *Gottschalk and Auerbach (eds.), Methods of Research in Psychotherapy*, New York.
- Kuhn, T. S. 1970. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.
- Oller, J. W. In press. *Language Tests at School: A Pragmatic Approach*. London Longman.
- Osgood, C. E. 1966. Dimensionality of the semantic space for communication via facial expressions. *Scandinavian Journal of Psychology* 7.1.
- Romano, J. 1973. in: *The yearbook of psychiatry and applied mental health*, Chicago Year Book Medical Publishers.
- Schumann, J. H. 1975. Affective variables and the problem of age in second language acquisition. *Language Learning*. 25.2.
- Schumann, J. H. J. Holroyd, R. N. Campbell, and F. A. Ward. 1978. Improvement of foreign language pronunciation under hypnosis: a preliminary study. *Language Learning* 28.1.
- Stevick, E. W. 1976. *Memory, Meaning and method: some psychological perspectives on language learning*. Rowley: Newbury House Publishers.
- Taylor, L. L., J. C. Catford, A. Z. Guiora, and H. L. Lane. 1971. Psychological variables and ability to pronounce a second language. *Language and Speech* 14.2.
- Taylor, B. P. 1974. Toward a theory of language acquisition. *Language Learning* 24.1.
- Upshur, J. A. 1975. Word frequency estimation in foreign language learning. Unpublished doctoral dissertation. The University of Michigan.
- Whorf, B. L. 1956. *Language, thought, and reality*. New York: Wiley.