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ABSTRACT

Research shows that information received by one brain hemisphere (e.g., auditory messages entering the right ear) is processed and transferred to the other, interpretation being a combination of right and left brain processing, with high intensity messages shifting control from the left to the right brain. If information is received by one hemisphere in isolation from the other (e.g., monaural reception inhibited by cross-ear masking), the opposite hemisphere must rely on input from the first hemisphere as if it were the same information it would normally receive from the ear. Hence, the analyses may be skewed by the different semantic and syntactic style of each hemisphere. In P. MacLean's concept of a hierarchical "triune brain"--three evolutionary brains stacked vertically--auditory messages are normally first processed by the R-Complex brain, reinterpreted by the Paleomammalian brain, and finally integrated and processed according to social rules and the logic of human experience in the Neomammalian brain. Together these theories imply that the auditory processing of advertisements is mediated by hemispheric style and possibly influenced by the evolutionary level of the brain controlling message interpretation. Thus, the type of advertising message (propositional versus nonpropositional, high versus low intensity) combined with masking (e.g., sales pitches using background noise heard on "walkman" radios) could obtain different degrees of acceptance by inducing isolated hemisphere reception. (JG)

TOWARD A HIERARCHICAL PROCESSING MODEL OF AUDIO ADVERTISING MESSAGES

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Abstract

The role of hemispheric processing of complex audio messages is examined. A model of message processing is posited which accounts for the roles of message complexity and emotional intensity. In particular, the model suggests that by "masking," or isolating, one hemisphere from the simultaneous reception of a message, different persuasive effects may be obtained under different message conditions. Masking, it is argued, allows for a practical use of hemispheric theory in audio advertising.

TOWARD A HIERARCHICAL PROCESSING MODEL

OF AUDIO ADVERTISING MESSAGES

Interest in how the brain processes the messages it receives has become a focal point for research in advertising in the past decade. This research, however, has centered on a processing approach which creates difficulties in interpretation of results via television. Interest in an area of advertising which has not been addressed and yields the possibility of fairly straight-forward interpretation is that of simple auditory processing, or messages presented via radio. The purpose of this paper is two-fold. First, it seeks to present an integrative theory of hemispheric processing of verbal and nonverbal auditory messages. Second, it builds upon behavioral research reporting different persuasive effects of auditory messages presented to one brain hemisphere while the other brain hemisphere is temporarily "isolated" from reception.

The focus of the paper is to build toward a theory of brain processing incorporating messages such as those received in radio -- or audio only -- advertising. Although there have been some attempts to examine the implications of hemispheric reception of advertising, this paper is distinct in that it examines only one modality of reception (auditory), it posits a theoretical explanation for the differential hemispheric processing due to the isolation of one hemisphere or the other, and it provides a practical way of inducing hemispheric isolation.

For a number of years advertising and communication researchers have been interested in how the brain processes and interprets messages. Research by Sidney Weinstein and his associates in advertising, for instance, has focused on how each brain hemisphere functions on a "split-brain" level.[1] This body of research, however, has been called in to question by a number of critics.[2] One criticism of this research has addressed the problems of divided attention and its measure from a visual perspective.[3] This past research has emphasized the structures attributed to the brain responsible for interpreting and processing advertisements. More recently, however, emphasis has turned toward a process interpretation of communicative messages, and particularly on that aspect of communication which is verbal in nature.

This essay examines the hemispheric processes through which we communicate. The proposed model suggests that the left and right hemispheres of the brain operate in a particular "style" best suited for the type of semantic information received and processed. It is argued that both the type of information processed by the brain and the processing system utilized can serve as distinguishing features for an analysis of advertising messages.[4] Such an argument has been recently advanced and initial support for such a model provided by Stacks and Sellers.[5] This model posits that complex auditory messages, such as those found in radio advertising, are processed in an integrative manner; that is, both hemispheres of the brain operate together to produce an interpretation of the message that is both qualitatively and semantically "correct."[6]

This model, although centered on the individual communicator, is a process model in that input from others and the environment is processed

for symbolic or normative information as language.[7] The symbols we process, then, become the language we use to selectively construct our view of the world and of others residing in that world. Symbolic process is a function of the human brain, a brain which is able to "communicate" with itself through thought (intrapersonal communication, or communication with self at a conscious level) and a brain able to "create" -- to fill in blanks -- abstractions.[8]

EARLY HEMISPHERIC INTERPRETATIONS

Until recently contemporary theory and research on how the brain processes information has been based on a rather simplistic model.[9] This model attributed to the human brain two "brains," each with specific properties. These properties, however, were said to be located in either one "brain" or the other. The two brains were actually the left and right hemispheres of what is considered to be the "whole brain."

This perspective of hemispheric dominance suggested that the processing of external stimuli resulted in an interpretation based on the type of information received by the processing hemisphere. Hence, that which dealt with the more formal and linguistic aspects of communication was processed by the left hemisphere and the more nonverbal types of information by the right hemisphere.[10]

Language, as represented by the language centers of the brain, was thought to lie primarily in two areas, both in the left hemisphere. Broca's and Wernicke's areas of the brain (located on the posterior inferior frontal region and the postcentral region of the left hemisphere, respectively) were for many years seen as the "centers" of discourse.[11] This analysis, based in part on lesions of both regions

and resultant language difficulties, proved to be a major influence on later hemispheric dominance theories for language.[12]

A different analysis of how humans process information also leads to the dominance for language paradigm. This analysis was based on the digital nature of language as opposed to analogical nature of nonverbal communication originally set forth by Watzlawick, Beavin, and Jackson.[13] Nonverbal researchers reinterpreted this difference in code material to the brain's processing of nonverbal communication more holistically and analogically with a resultant "superiority" (dominance) for emotional receptivity and spatial/temporal analyses.[14] Other researchers have suggested that other communication forms, such as music or television are more right hemisphere dominant.[15]

More recently, the notion of hemispheric "style" has been suggested as more truly representing the way in which the brain processes communication-related information.[16] This perspective is based on the integrated functioning of the right and left hemispheres in normal day-to-day interactions. It is also based on biological, psychological, and sociological differences in the way the whole brain contributes to the concept of "mind" or "consciousness."[17] How and why we communicate can be based on how the brain processes the information it receives; this paper, however, focuses more on the verbal message and its processing. In so doing, our bias will be directed toward the auditory processing of the message.

Auditory Processing of Messages

The material used in daily communications is perceived through the senses. We hear verbal messages, we see some of these messages in the form of writing, but we also "see" nonverbally in that verbal messages

may "create" a feeling of nonverbal sensation.[18] Nonverbal messages also are communicated through touch, smell, and possibly taste. Most people, however, associate communication with the auditory processing of verbal messages -- or "language" but few understand the physiological processes involved in the reception and processing of a verbal message.

Auditory reception of a verbal message occurs through the sense of hearing. This involves the reception of a message in the form of sound waves being received by the ear and transformed to mechanical and finally chemical stimuli. Anatomically, the nerve fibers from the right cochlea (right ear) cross to the contralateral side of the brain stem and course upward through the synapse stations of the auditory brainstem. The reverse is true of the left ear. That is, the sound is received by one ear (right or left) and processed by the opposite side of the brain; this causes information presented to the right ear to be received primarily by the left hemisphere and vice versa. In dichotic listening tasks or when the researcher is interested in presenting information to one hemisphere or the other, this crossing of fibers in the auditory brainstem must be taken into consideration. (See Figure 1.)

The nerve fibers from the cochlea first synapse (pass) at the dorsal and ventral cochlear nucleus. From the cochlear nucleus, the majority of the fibers course to the superior olivary complex on the contralateral side. Some of the fibers course ipsilaterally (up the same side of the brain as the ear received) to the superior olive of the receiving ear and continue up the ipsilateral side. The fibers next pass through the lateral lemniscus to the inferior colliculus and then on to the medial geniculate. Along this pathway (at the level of the

superior olive, inferior colliculus and perhaps the lateral inferior colliculus) they recross the brain stem from contralateral to ipsilateral side.

It appears that there are no interconnections (contralaterally-ipsilaterally) at the level of the medial geniculate bodies. Finally, the fibers insert in the auditory reception areas of the temporal cortex (Sylvian fissure). This makes the study of the hemispheric role in auditory processing more complicated than from a simple dominance perspective.[19] The role of the ipsilateral message, as well as other components (alerting processes) are not well understood, but it is assumed that the perception and processing of linguistic stimuli occur at the level of the of the auditory complex.[20]

Linguistic Processing of Messages

The left hemisphere appears to be predisposed for language. Studies in central auditory processing have shown the neuromaturational aspect of this system.[21] As the human ages from 5 to 13 years, the strong right ear, left hemisphere advantage observed among young children learning their language begins to disappear and an asymmetry of processing is observed. The fact that the left hemisphere has shown this predisposition to language has lead some researchers to consider the left hemisphere dominant for language with the right hemisphere relegated to the role of nonverbal communication (interpretation of non-speech sound; music; etc.).

Stacks and Sellers have suggested that a more correct interpretation of this asymmetry is that of hemispheric "style," with the emphasis placed on the type of processing the left and right hemispheres' engage in rather than the simplistic dichotomy, "speech"

and "non-speech."[22] The hemispheric style model maintains the anatomical fact of brain stem crossover, but also considers the role of each hemisphere in the creation of discourse. The processing of language is accomplished in both hemispheres according to the more qualitative aspects of the incoming message.[23] That is, the type and location of message processing will depend upon the type of message decoded and processed.

The hemispheric style model can be used to both explain how the brain processes verbal communication and why certain messages require different processing strategies. The model proposes that both hemispheres of the brain process language, but the type of message and the semantic properties of that message alter normal processing. Simply put, normal processing would have both hemispheres of the brain receive the same input through each ear and then process the information along the particular auditory and nerve pathways. Once the information is received at the higher brain levels, processing occurs in both hemispheres regardless of which hemisphere is "dominant." That is, each hemisphere has a particular function in the analysis of the message, although perception of the processing may or may not be "recognized" by whichever hemisphere is "dominant" for interpretation of the message (i.e., whether or not the message is more verbal or nonverbal, moderate or intense, etc.).

For instance, the linguistic aspects of message processing are basically found in the left hemisphere. In this way, the more logical and rule-oriented hemisphere processes the structure of language. For example, the sentence "See the dog run" may be processed by the left hemisphere without assistance from right based on the linguistic rules

of a simple, non-qualified sentence or phrase. However, when a qualification is added to the message such as, "See the beautiful dog run!" the interpretive aspects of the message require right hemisphere input. As the message becomes more intense linguistically (the message increases in emotional involvement),[24] more involvement of the right hemisphere occurs.

In support of such an interpretation, Stacks and Sellers discovered that a message of moderate intensity was not adequate to invoke right hemispheric participation in the interpretation process.[25] Although both hemispheres receive the same material, the left hemisphere appears to be responsible for decision-making regarding the total message and its intent. Part of the explanation for such a phenomenon is found in the right hemisphere's ability to process the type of linguistic information it works with at a speed much faster than the left, which is handicapped in this case by the processing necessary to make complex linguistic decisions. Such an interpretation has received partial support in research indicating that the right hemisphere is able to process "qualitative" information at a speed much faster than the left hemisphere.[26] This processing differential results in a normal asymmetrical relationship between hemispheres such that highly intense information is quickly evaluated and transferred to the left with the right's "interpretation" attached to it. In situations where qualification occurs, the right hemisphere's interpretation is incorporated into the message during the left hemisphere's processing of the linguistic rules and processes. If the message contains only moderately intense language, however, the left hemisphere's logical

capabilities may allow for simple processing to occur, without recognition of simultaneous right hemispheric input.

Tied closely to the concept of hemispheric style and intensity of message are the language processes of each hemisphere. Bogen has suggested that the left hemisphere's language is more "propositional," whereas the right hemisphere's language is more "apropositional."[27] This distinction suggests that the left hemisphere's language processing is more akin to the analytical, syntactical, and deliberative style suggested earlier. The right hemisphere's processing style, however, is more relational and, perhaps, unconscious.

Ross Buck argued along this same line, but suggests that there exists a possibility for right hemisphere language.[28] This language he defines as nonpropositional. By this Buck notes that right hemispheric language may be verbalized, but may not be consciously produced. Much like a Freudian slip, nonpropositional language may be a simple statement tied to a particular emotional or physical referent. Stacks and Dorsey noted that many of these so-called Freudian "slips" seem to refer to emotional or spatial-temporal stimuli, stimuli inherently right hemispheric.[29]

Perhaps the most controversial part of the hemispheric style model is found in the argument advancing the transmission of complex messages across the brain's corpus callosum. Stacks and Sellers argue that their behavioral findings suggest a corpus callosum transmission of complex (analyzed) messages from one hemisphere to the other. This transmission is necessary, they argue, due to the hemispheric stylistic differences and the brain's ability to incorporate interpretations as a total corpus of the message.[30] Based on research examining brain activity in

response to advertising content, Weinstein, Weinstein, and Drozdenko, also found support for corpus callosum transport.[31] Further support for such a position is found the work of Musiek, Kibbe, and Baran who note that in dichotic hearing studies where the left ear input "is projected to the right hemisphere. . . information must travel across the CC [corpus callosum] to the left hemisphere if it is to be processed linguistically."[32]

Although research into the corpus callosum's role in message transmission is sparse, some electrophysiological research suggests that the corpus callosum can and does transmit complex messages.[33] Additionally, measures of suppressed alpha-wave activity for different cognitive processing tasks further points to message transmission across the corpus callosum. A number of studies have demonstrated different right and left hemispheric task relationships via EEG activity. (When a hemisphere is activated the amount of alpha-wave activity is reduced, hence the idea of measuring the suppression of alpha activity as an indication of hemispheric activity.) Moore found that when asked to process recall tasks (cognitive and analytical), subjects suppressed alpha activity in the left hemisphere.[34] As might be expected, when recognition tasks (cognitive and visually-oriented language) were processed, right hemispheric alpha activity was suppressed. Since the brain incorporates in its analyses and interpretations a symmetrical left hemisphere-right hemisphere activity, transmission via the corpus callosum seems to be the most viable explanation for the processing of complex linguistic messages. The way in which we communicate, then, is in part due to which hemisphere processes the stimuli of communication. Further, since "thought" may be defined as subvocal auditory

communication, the process by which we prepare to communicate (rehearse), is also influenced by the hemisphere activated. Hence, internal feelings, tagged with semantic labels, become stimuli processed by both the right and left hemispheres. Interpretations of such messages would naturally follow along the same processing lines as verbalized messages.

Confounding such an interpretation, however, are modes of communication which incorporate more than one sense. One such mode is visual communication. Of the research conducted in advertising effects, the vast majority has dealt with the visual, or television mode, of advertising. Such research has relied on EEG activity in assessing whether one hemisphere or the other is activated during different advertising presentations. The research of Weinstein et al. and Krugman falls into this region. Research might be more productive in a more isolated form of message presentation -- radio -- where there exists no "competing" complimentary information passing up the neural passages.

The criticism of competing messages has been invoked by others, under different terminology. For instance, Krugman has argued that differences obtained in advertising research on differing modes of advertising (television versus magazines, for instance), might be due to fatigue or lack of attention rather than simple processing.[35] Rossiter points out that differences "could be due to conditioned arousal response rather than to any content differences. . . ."[36] Hence, auditory messages might provide a more adequate test of lateralization and message processing. The next section suggests a processing model for such processing based on auditory messages which may be operationalized as radio advertisements.

TOWARD A HIERARCHICAL PROCESSING MODEL OF AUDIO ADVERTISING MESSAGE

To this point, the processing of auditory messages has suggested a rather linear perspective. That is, what is received by one hemisphere is processed and transferred to the other across the corpus callosum. As Stacks and Sellers noted, the complex transmission of a message may, in the case of monaural reception and inhibited by cross-ear (contralateral) masking, produce linear transmission by both the right and left hemispheres.[37] They suggest that the left hemisphere, when receiving auditory information in isolation from the right's interpretation transfers a complex message to the right for specialized interpretation. This analysis, however, is limited to that of the left's initial analysis due to lack of supporting information from the right hemisphere. The right hemisphere, then, must rely on input from the left hemisphere as if it were the same information it would normally receive. Hence, the analyses may be skewed.

This interpretation suggests that the information received by both hemispheres is stylistically different not in terms of actual type of information, but differentiated by hemispheric style. It also suggests that the right hemisphere possesses a language, albeit unconscious or rudimentary in form. Such processing seems to run counter to the "predispositional" case made for language dominance. One way to reconcile this apparent discrepancy may be in the way we perceive the brain's structure. To this point we have taken a rather two-sided approach to language processing -- that is, the right and left hemispheres are the major concern in how we process the information which leads to discourse. A different perspective suggests that we may

have to (1) take the whole brain into account when examining discourse from this perspective and (2) examine how this brain operates on a stylistic basis.

An Evolutionary Model

Contemporary theory holds that we must take the entire brain into account when examining how it processes the information it receives from the senses. This perspective is amenable to Paul MacLean's concept of a triune brain.[38] MacLean proposes that the human brain is composed of three interrelated brains, each different on two accounts. First, the brains differ in their evolutionary level. MacLean outlines three evolutionary brains, each sitting atop the other. In this manner the most primitive, the R-Complex brain sits at the base of the brain stem and is responsible for urges and reflex actions and reactions. The next higher brain, the Paleomammalian brain, is composed of the limbic system and deals with impulses and qualitative aspects of behavior. This brain, according to MacLean is non-language-oriented and may consist of the more normative behaviors associated with nonverbal communication.[39] The most recent brain, that which is composed of the neocortex, is the Neomammalian brain. This is the brain responsible for images, social laws, complex symbolic patterns, and thought.

MacLean's model does not reduce the impact of brain style. Although not taking into consideration the two hemispheres, it has been suggested that the difference between man and other species possessing a neocortex is the asymmetrical nature of the human brain. Brown argues that the ability to use two brains, each specialized or tuned for a particular style (verbal or nonverbal, digital or analogical, noun-verb relationship or qualifiers of the proposition, recall or recognition),

produced a species unique in that it possesses six brains (two hemispheres or "brains," each with three evolutionary brains).[40] Brown's analysis, however, still posits the left hemisphere as verbal and the right as nonverbal.

Toward A Hierarchical Model

MacLean's triune brain, however, does into take into account the complex process by which the human being uses language. That is, language occurs at the level of the neocortex regardless of hemisphere examined. Another way of interpreting what MacLean has suggested is in the way that each of the three brains interrelate via hemispheric style.[41] This perspective allows for the interpretive differences of each hemisphere and the processing differences of each evolutionary brain.

Auditory messages received in normal communicative contexts would be received by both the left and right hemispheres. This reception, however, is processed in the following manner: information would first be processed by the R-Complex brain. This information then would be transmitted to the Paleomammalian brain, which would re-interpret the message and send it on to the Neomammalian brain. At this level the information would be integrated and processed according to social rules and the logic of human experience.

An example of this processing would be the reception of a normal message with moderate emotional content. For instance, take the message, "I love you." The R-Complex brain's initial reaction (reactive and sexual, baseline survival and instinctive -- at the level of some nonverbal messages) would be moderated by the Paleomammalian brain's interpretation of the emotional content and context of the

message. The message would then be sent to the Neomammalian brain for final interpretation which might be sarcastic, loving, lusting, etc.[35]

Such an interpretation does not take into account the brain's two hemispheres. However, it does suggest a possible influence on hemispheric interpretation of the message. The way in which a message is interpreted, even one as simple and yet existential as "I love you," is more than simply right or left hemispheric. It is the combination of different stylistic interpretations made by both hemispheres to the total message corpus which must be taken into account. This combination, as discussed earlier, suggests that the left hemisphere's analytical, logical, and rule-governed style is appropriate for moderate to low intensity messages. However, when the message contains information which is highly intense (as in a "pitch" form of advertising which would include both verbal and nonverbal intensity), the right hemisphere's interpretation must be taken into account. The ability to manipulate language intensity in messages has been addressed in other research, but it should suffice to note here that traditional research posits that moderate message intensity is most persuasive.[42]

Stacks has suggested that this process may help to understand situations where messages become persuasive even though they fall outside the realm of "moderateness" of message intensity.[43] At times the emotional content of the message may force a cross-over from left hemispheric to the right hemispheric control. This control would necessitate a different type (intensity) of message. As Stacks and Dorsey and Sellers and Stacks have argued, this type of message would (1) be less logical and (2) more intense than the normally "controlled" left hemisphere's interpretation.[44]

Some Theoretical Implications

The model discussed thus far suggests that masking can be used to induce isolated hemispheric reception to advertising messages. While masking is a traditional tool for isolating one hemisphere from the other, it is possible that masking occurs psychologically or through general processes.[45] It is important, therefore, to keep in mind a possible interaction between type of masking and hemispheric interpretation of the message. This may become important from an advertising point of view when one considers the mixture of various elements, to include possible emotional involvement with the masking employed and consequentally its effectiveness. Stacks and Sellers, for instance, found no differences between a "linguistic" (four-speakers simultaneously reading different texts) masking noise and a "non-linguistic" (cafeteria noise), but did not test other potential masking noise. Obviously, masking employing different types of music might produce different effect. Research is currently under way testing this possiblity.

Based on this model of the brain and advertising processing there are four theoretical statements which may be derived from the current corpus of research.

I. The two hemispheres of the brain process information according to both semantic and syntactic style.

Both analogical (continuous, infinite, and natural units of information, i.e., nonverbal) and digital (arbitrary, discrete, and finite bits of information, i.e., verbal) and propositional (conscious) and nonpropositional (unconscious) information is received by each

hemisphere (assuming normal, stereophonic reception of a message). The particular analyses accomplished depend more upon the intensity of the language and whether or not the language is propositional or nonpropositional.

Tests of this proposition would take into account the different types of "messages" we aim at receivers. By beginning at the most fundamental, auditory, message and testing via both traditional behavioral measures such as paper and pencil reactions and ratings and neurophysiological activity, both semantic level and syntactic style analyses would indicate how the brain processes linguistic and extra-linguistic information.

II. Complex messages are analyzed by both the left and right hemispheres; interpretation, however, will depend on the intensity and structure of the message.

Even monaural reception of messages requires that both hemispheres act on the information received. In the case of a blockage of the auditory pathway to one hemisphere or the other, the message would be sent to the other hemisphere for analysis and interpretation. Since there is an ability built into stereophonic message transmission to "mask" an ear, the impact of such presentation of the message is of obvious interest. Advertisements aimed at users of "walkman"-type radios could use the type of advertisement ("pitch" versus "institutional") and masking (right versus left) to obtain different degrees of acceptance without the listener actually knowing they had been "manipulated." Of question here, however, would be the type of masking and its effect. (Sellers and Stacks found no difference between

"white" background noise and linguistic-like noise, hence, background noise such as music sent only on right ear channels may be enough to induce a "masking" effect. Research is currently underway investigating both type of advertising and type of masking on acceptance of the mes.age.)

III. Message transmission occurs both between hemispheres and between brain levels.

As noted, messages are analyzed both in terms of hemispheric involvement and style. Normal control of the communication process resides in the left hemisphere where control is socialized and rationalized. At times control may switch to the right hemisphere, resulting in non-normative or even anti-social communications. The major connector between the two hemispheres for language and thought is the corpus callosum. Tests of this proposition are primarily neurological. Speed of processing can be correlated to which side of the brain is activated. How fast decisions are made and the degree to which they are adhered to may indicate which level of brain has been activated. The processing speed of emotional messages, without expansive verbal reinforcement, for example, could be measured against those which were less emotive. Obviously, complexity increases processing time. The addition of emotion should increase or decrease processing time, depending on on level of complexity, i.e., emotional elements should decrease processing time for the less complex message and increase processing time for the more complex message.

IV. The corpus callosum transmits complex messages for proper interpretation and analysis.

The transmission of verbal and sub-vocal messages by the corpus callosum represents an area for future research. Galin, for example, suggests that the corpus callosum can be "blocked" from transmitting messages from one hemisphere to the other by electrocortical charges created by one or the other hemisphere. Such blockage would result in a processing of the communication by only one hemisphere and the style of that hemisphere would then yield a "dominant" interpretation.[46] Tests of this proposition are central to any study of lateralized message processing. Studies emphasizing the effect of advertising, rather than simple right versus left processing in general, will test this proposition. Behavioral research points out the possibility of such processing and, while concomitant neurophysiological research remains limited both in theoretical scope and method, it may yet prove productive.

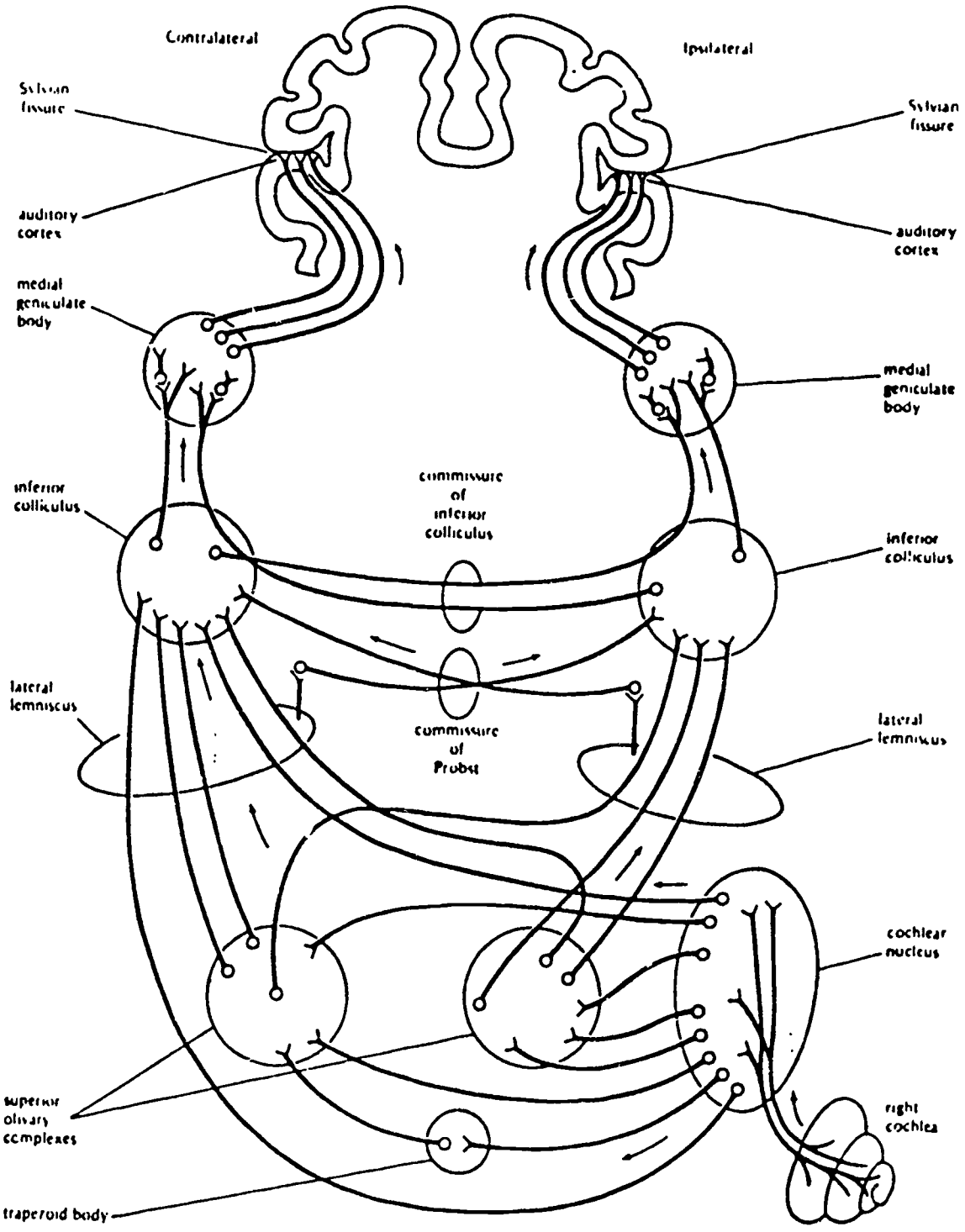
SUMMARY

This paper has suggested that the processing of advertisements -- primarily radio advertisements -- is mediated by hemispheric style and possibly influenced by the evolutionary level of the brain in control of message interpretation. We have argued that the auditory processing of advertising is influenced by <u>both</u> processes. The proposed model is predicated on the assumption that humans process information functionally by utilization of two asymmetrical brains and across three evolutionary brains. Although we may receive information through three "evolutionary" brains, each possesses the capacity for language and may operate on a less than conscious level. This interpretation allows for differential interpretation of messages which may differ primarily in intensity or emotional components.

This paper integrates a new body of knowledge and conjecture. Future research will attempt to differentiate the influence of each "brain" and hemisphere on advertising strategy. This body of research should consist of both behavioral and psychological methods and strive to relate to both behavioral and "attitudinal" or conscious-unconscious processing of advertisements. The theoretical approach offered is distinct in that it examines the impact of messages presented via one modality (auditory), it posits a theoretical explanation for the differential hemispheric processing due to the isolation of one hemisphere or the other, and it provides a practical way of inducing hemispheric isolation.

FIGURE 1.

Anatomy of the Ascending Auditory Pathways



Source: William A. Yost and Donald W. Nielsen, Fundamentals of Hearing: An Introduction (New York: Holt, Rinehart and Winston, 1977), p. 93.

Notes

[1]See: Valentine Appel, Sidney Weinstein, and Curt Weinstein, "Brain Activity and Recall of TV Advertising," Journal of Advertising Research 19 (1979), 7-15; Sidney Weinstein, Valentine Appel, and Curt Weinstein, "Brain-Activity Responses to Magazine and Television Advertising," Journal of Advertising Research 20 (1980), 57-63; Sidney Weinstein, "A Review of Brain Hemisphere Research, Journal of Advertising Research 22 (1982), 59-63; Sidney Weinstein, Ronald Drozdenko, and Curt Weinstein, "Advertising Evaluation Using Brain-Wave Measures: A Response to the Question of Validity," Journal of Advertising Research 24 (1984), 67-71.

[2]See, for example: William A. Katz, "Point of View: A Critique of Split-Brain Theory," Journal of Advertising Research 23 (1983), 63-66; Herbert E. Krugman, "Point of View: Sustained Viewing of Television," Journal of Advertising Research 20 (1980), 65-68; Herbert E. Krugman, "To the Editor," Journal of Advertising Research 20 (1980), 63; John R. Rossiter, "Point of View: Brain Hemisphere Activity," Journal of Advertising Research 20 (1980), 75-76.

[3]Krugman; Rossiter.

[4]Both Weinstein ("A Review of Brain Hemisphere Research") and Katz ("Point of View") point out that research must include both hemispheres' contributions to the processing of communication.

[5]See: Don W. Stacks, "Toward a Preverbal Stage of Communication," Journal of Communication Therapy 2 (1983), 39-60; Don W. Stacks and Daniel E. Sellers, "Toward a Holistic Approach to Communication: The Effect of 'Pure' Hemispheric Reception on Message Acceptance,"

Communication Quarterly 34 (1986), 266-285; and Daniel E. Sellers and Don W. Stacks, "Brain Processing and Therapy: A Conceptual and Research Frontier," Journal of Communication Therapy 3 (1985), 30-50.

[6]Stacks and Sellers.

[7]Stacks.

[8]See: Weinstein; James W. Cheesbro, "The Media Reality: Epistemological Functions of Media in Cultural Systems," Critical Studies in Mass Communication 2 (1984), 111-130; cheesbro argues from a communication perspective the relationship between brain, perception, and language. See also: Joseph B. Hellige, "Cerebral Hemisphere Asymmetry: Methods, Issues, and Implications," Educational Communication and Technology 2 (1980), 83-98, for an excellent review of language and the brain.

[9]See: Sidney J. Segalowitz, Two Sides of the Brain: Brain Lateralization Explored (Englewood Cliffs, NJ: Prentice-Hall, 1983); S. P. Springer and G. Deutsch, Left Brain, Right Brain (San Francisco: W. H. Freeman, 1981); Richard Restak, The Brain: The Last Frontier (New York: Doubleday, 1979); and Richard Restak, The Brain (New York: Bantam, 1984).

[10]cf., Peter A. Andersen, John P. Garrison, and Janis F. Andersen, "Implications of a Neurophysiclogical Approach for the Study of Nonverbal Communication," Human Communication Research 6 (1979), 74-89; Weinstein.

[11]For the original research, see: P. Broca, "Sur la Faculte du Language Articule," Bulletin Societe Anthropologia 6 (1865), 493-494; and C. Wernicke, "The Symptom-Complex of Aphasia," in A. Church (ed.) Diseases of the Nervous System (New York: Appleton, 1908). For a good

review of the "language centers" and the dominance perspective, see: Segalowitz; and Michael C. Wittrock (ed.), The Human Brain (Englewood Cliffs, NJ: Prentice-Hall, 1977).

[12]cf., Segalowitz; Wittrock.

[13]Paul Watzlawick, Janet H. Beavin, and Don D. Jackson, Pragmatics of Human Communication (New York: Norton, 1967).

[14]See: Mark Hickson and Don W. Stacks, NVC: Nonverbal Communication Studies and Applications (Dubuque, IA: William C. Brown, 1986); Loretta Malandro and Larry L. Barker, Nonverbal Communication (Reading, MA: Addison-Wesley, 1982); and Judee K. Burgoon and Thomas J. Saine, The Unspoken Dialogue: An Introduction to Nonverbal Communication (Boston: Houghton Mifflan, 1978).

[15]See: Cheesbro; Weinstein; Rossiter; Krugman, "Point of View"; Appel et al.; Weinstein et al., "Brain Activity Response"; and Weinstein et al., "Advertising Evaluation."

[16]Sellers and Stacks; Stacks "Toward A Preverbal Stage"; Don W. Stacks and Lee A. Dorsey, "Toward a Psychological-Neurophysiological Interpretation of Nonverbal Communication," Journal of Communication Therapy (in press); Donna R. Vocate, "Differential Cerebral Speech Lateralization in Crow Indian and Anglo Children," paper presented at the Annual Convention of the Speech Communication Association, Louisville, KY, 1982; and Donna R. Vocate, "Lateralization of Auditory Language: An EEG Study of Bilingual Crow Indian Adolescents," Communication Research Reports 2 (1985), 46-52.

[17]See, for example: Charles Furst, The Origins of the Mind (Englewood Cliffs, NJ: 1979); Hickson and Stacks; and Mark Hickson,

III, "Toward a Biosocial Theory of Human Communication," M.A. thesis, Mississippi State University, 1981.

[18]See: Hickson and Stacks, Chapter V.

[19]William A. Yost and Donald W. Nielsen, Fundamentals of Hearing: An Introduction (New York: Holt, Rinehart and Winston, 1977).

[20]See: Sellers and Stacks; Stacks. For a discussion of visual differences, see: Andersen, Garrison, and Andersen; and Weinstein, Drozdenko, and Weinstein. For an overview of ipsilaterality and contralaterity, see: T. C. Ruch, J. W. Woodbury, and A. L. Towe, Neurophysiology (Philadelphia: W. B. Saunders, 1961).

[21]Robert W. Keith (ed.), Central Auditory and Language Disorders in Children (Houston: College-Hill, 1981); and Jack Williford, "Sentence Test of Central Auditory Dysfunction," in Jack Katz (ed.), Handbook of Clinical Audiology, 2nd ed. (Baltimore: William and Wilkins, 1978).

[22]Stacks and Sellers; Stacks; Sellers and Stacks.

[23]See: Segalowitz; Stacks and Sellers; Stacks and Dorsey; Sellers and Stacks; Weinstein; Jere Levy, "Right Brain-Left Brain: Fact and Fiction," Psychology Today (May 1985), 38-44; and Katz, especially, pp. 64-45.

[24]For more information on the concept of language intensity, see: Michael Burgoon and Gerald R. Miller, "Prior Attitude and Language Intensity as Predictors of Message Style and Attitude Change Following Counterattitudinal Advocacy," Journal of Personality and Social Psychology 20 (1971), 240-253; Michael Burgoon, Marshall Cohen, Michael Miller, and Charles Montgomery, "An Empirical Test of a Model of Resistance to Persuasion," Human Communication Research 5 (1978), 27-39;

Michael D. Miller and Michael Burgoon, "The Relationship Between Violations of Expectations and the Induction of Resistance to Persuasion," Human Communication Research 5 (1979), 301-313; and Don W. Stacks, "An Experimental Investigation of Mode of Presentation and Verbally-Induced Distraction on Communication Acceptance," paper presented at the Annual Convention of the International Communication Association, Dallas, TX, 1983.

[25]Stacks and Sellers.

[26]R. Ley, "Emotion in the Right Hemisphere," Unpublished dissertation, University of Waterloo, 1980); Leonard J. Shedletsky, "Cerebral Asymmetry for Aspects of Sentence Processing," Communication Quarterly 29 (1981), 3-11; Leonard J. Shedletsky, "Cerebral Asymmetry for Aspects of Sentence Processing: A Replication and Extension," Communication Quarterly 31 (1983), 78-84.

[27]James E. Bogen, "Some Educational Aspects of Hemispheric Specialization," UCLA Educator 17 (1975), 22-25.

[28]Ross Buck, "Spontaneous and Symbolic Nonverbal Behavior and the Ontogeny of Communication," in Robert S. Feldman (ed.), Development of Nonverbal Behavior in Children (New York: Springer-Verlag, 1982); Katz also suggests right hemispheric language, but provides no references or studies in building his case.

[29]Stacks and Dorsey.

[30]Stacks and Sellers used a paradigm which prevented one hemisphere or the other from receiving the message (the hemisphere was blocked via a "masking" procedure to the appropriate ear), hence analysis had to occur in the left hemisphere for any cognitive decisions

to be made. This occurrence, they argue, points to the transmission of messages across the corpus callosum.

[31]Sidney Weinstein, Curt Weinstein, and Ronald Drozdenko, "Brain Wave Analysis: An Electroencephalographic Technique Used for Evaluating the Communication Effect of Advertising," Psychology and Marketing Journal 1 (1984) 12-26.

[32]F. E. Musiek, K. Kibbe, and J. A. Baran, "Neurological Results from Split-Brain Patients," Seminars in Hearing 5 (1984), 219-229.

[33]Weinstein et al., "Brain Wave Analysis"; Appel et al.; Weinstein et al., "Brain-Activity Responses." See also: Charlotte Dempsey, "Some Thoughts Concerning Alternate Explanations of Central Auditory Test Results," in Robert W. Keith (ed.), Central Auditory Dysfunction (New York: Grune & Stratton, 1977), 293-318.

[34]Walter R. Moore, Jr., "Alpha Hemispheric Asymmetry of Males and Females on Verbal and Non-Verbal Tasks," Cortex 15 (1979), 321-327.

[35]Krugman, "Point of View."

[36]Rossiter, 75.

[37]Stacks and Sellers.

[38]Paul MacLean, "On the Evolution of Three Mentalities," in Silvano Arieti and Gerard Chrzanowke (eds.), New Directions in Psychiatry: A World View, II, (New York: John Wiley and Sons, 1971), 309-320; Paul MacLean, "The Brain's Generation Gap: Some Human Implications," Zygon/Journal of Religion and Science 8 (1973), 113-127; Paul MacLean, "Cerebral Evolution and Emotional Processes: New Findings on the Strietal Complex," Annals of the New York Academy of Sciences 193 (1972), 137-149; and Paul MacLean, "The Paranoid Streak in Man," cited in Restak, The Brain: The Last Frontier.

[39]Jason Brown, Mind, Brain, and Consciousness (New York: Academic Press, 1977).

[40]Brown; see also: Hickson and Stacks.

[41]Stacks, "Toward a Preverbal Stage;" Sellers and Stacks; Stacks and Sellers.

[42]See: G. R. Miller and Burgoon; Burgoon et al.; M. D. Miller and Burgoon; Stacks, "An Experimental Investigation."

[43]Stacks, "Toward A Preverbal Stage."

[44]Stacks and Dorsey; Sellers and Stacks. See Stacks and Sellers for an example of the impact of moderate versus intense message processing.

[45]David Galin, for instance, argues that one hemisphere of the brain may isolate itself from the other through electrocortical transmission. David Galin, "Hemispheric Specialization: Implications for Psychiatry," in R. G. Grenell and S. Gayay (eds.), Biological Foundations of Psychiatry (New York: Raven Press, 1976). This electrical charge may yield reaction and/or processing from one hemisphere or the other without input from the other. Language also may yield such "masking," see: Stacks, "Toward A Preverbal Stage."

[46]Galin.