Voice and Advertising: Effects of Intonation and Intensity of Voice on Source Credibility, Attitudes Toward the Advertised Service and the Intent to Buy

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Summary.—Voice has been neglected in research on advertising and attitude change. In an experiment with $2 \times 2 \times 2$ factorial design ($N = 279$), several hypotheses derived from the Elaboration Likelihood Model and from phonetic literature were tested: 2 linguistically similar advertising messages on financial services of high (student loan) versus low (Automatic Teller Machine cards) involvement are recorded by a professional actor using 4 types of voice (2 levels of intonation of voice $\times 2$ levels of intensity). Analysis by a system of simultaneous equations indicated that the effects of voice are different under low and high involvement. Intensity of voice affects credibility of the source significantly more under low than high involvement; intonation of voice affects credibility more under high than low involvement. Unexpectedly, characteristics of voice affect attitudes toward the advertised service and intent to buy.

Voice as an Ignored Vehicle of Persuasion

Whereas voice is a natural medium to carry emotionally and cognitively laden messages, its effects on attitudes toward advertisements have been overlooked so far by researchers. Harris, Sturm, Klassen, and Bechtold (1986) reviewed the advertising literature from a psycholinguistic perspective and found only one article (Coleman, 1983) in which are discussed the potential effects of phonological features on attitudes toward advertising. They concluded that “phonological aspects have not been studied heavily in regard to advertising specifically,” since no published paper has yet investigated the “potential for some important psycholinguistic work” on voice in the field of advertising. They also pointed out that some phonological aspects of language deserve more attention in advertising research and suggested that advertising messages include tactics to convey particular impressions about the speaker or the product. They stressed that a speaker talking “like a real plumber” should be a credible source in an advertisement for a plumbing
product. However, they did not describe the characteristics of a plumber's voice for the appropriate target audience.

None of the four basic advertising models identified by Lutz, MacKenzie, and Belch (1983) describes possible effects of voice characteristics. Even more striking is the total absence of reference to voice in Petty, Cacioppo, and Schumann (1984). In their article on the implications of the Elaboration Likelihood Model for salesmen, they noted that voice is a potentially fruitful area of research, since it is really the salesman's main vehicle for communication and persuasion. Nevertheless, voice is not used as a variable in any of the Petty and Cacioppo empirical studies on the model. A study by Peterson, Cannito, and Brown (1995) shows that two major voice characteristics are related to a salesperson's commercial performance, i.e., successful salespersons speak faster and with a more marked falling in their contour of fundamental frequency. These results demonstrate the wide gap between empirical research and theoretical developments in models of both advertising and salesmanship.

The effects of voice in advertising have been reported in passing by Anand and Sternthal (1990) in their pilot study assessing the effect of presentations of message on the ease of processing an advertising message. In this study, the message is "read dramatically" or "sung to a piano accompaniment." Even if it does not consider explicitly characteristics of voice as a variable, the findings show that intonation affects the perception of the advertisement. The "sung message" had a marked intonation and was more difficult to understand and more likable; it seemed more novel than the "read message" which had a less marked intonation (p. 348).

A meta-analysis of 114 studies on credibility of source by Wilson and Sherrell (1993) demonstrated the effect of the oral media used in persuasion and tended to confirm that the use of voice in such processes needed special attention:

"... persuasion effects in studies using oral communication from the source were larger, on average, compared to effects when other forms of message media were used... The average ranking of effects in studies using oral communication was significantly greater than the average ranking of effects in studies using a combination of media vehicles (for example, print advertisements and an oral message together)" [p. 106, our emphasis].

The Potential Influence of Voice in the Elaboration Likelihood Model

As shown in the phonological literature voice is an antecedent of credibility and, as such, can be potentially classified as a cue of the 'peripheral route' in Petty and Cacioppo's Elaboration Likelihood Model. In the model, the 'peripheral route' is related to all elements which are not 'central,' i.e., arguments, information, content of the message. Peripheral cues constitute a somewhat heterogeneous set, which includes diverse cues about the source (expertness, likability, attractiveness, similarity with customers) and the mes-
sage (number of arguments, message execution, presence of pictures, humor, etc.). Voice is not only a neglected research topic in advertising, but also its role in established models has to be defined in regard to the other variables. Characteristics of voice are then potentially classifiable as the antecedents of a 'peripheral' cue, which may affect the process of persuasion under low involvement only. The degree to which this influence of voice is literally marginal in the model is contradicted by a number of phonological studies, which show clearly the effect of voice on credibility.

Voice as an Antecedent of Credibility and Image of the Source


The relation between the image of the source and some prosodic features of the voice, including rate of speech (Lee & Boster, 1992; Smith & Shaffer, 1991; Woodall & Burgoon, 1983), voice pitch (Apple, Streeter, & Krauss, 1977; Brown, Strong, & Rencher, 1974; Ekman, 1988), and voice disorders (Pittam & Gallois, 1987; Ruscello, Lass, & Podbesek, 1988) have been abundantly documented.

Two prosodic features of the voice seem to have received special attention, intensity and intonation. Intensity is defined as signal loudness and intonation is defined as pitch variation which reflects the voice's melodic contour. Individuals who speak loudly are perceived as more able to articulate their arguments and present a higher efficiency of verbal activity. The style of powerful speaking seems to be more attractive as reported by many authors; powerful speakers are perceived as more credible and trustworthy than powerless speakers (Bradac, Mulac, & House, 1988; Brooke & Ng, 1986; Erickson, Lind, Johnson, & O'Barr, 1978; Lind & O'Barr, 1979). Competence could be also inferred from a powerful speaking style (Bradac, et al., 1988; Fraser & Nolan, 1981; Miller, Maruyama, Beaber, & Valone, 1976). A marked intonation accompanied with a high pitch of the voice contributes to an impression of competence (Apple, et al., 1977). High intonation gives the impression that the speaker is lacking self-confidence, whereas, on the contrary, small variations of intonation reflect self-confidence, competence, and trustworthiness (Brooke & Ng, 1986; Helfrich & Wallbott, 1986).

Effects of Voice on Attitudes Toward the Message

Although very few studies focus on the effects of voice on the attitudes toward the content of the message, it is clear that voice can carry informa-
tion not indicated by verbal content. More specifically, tone of the voice can complement information not evident in the more controllable verbal content (Bugental & Love, 1975; Weitz, 1972; Zuckermann, Larrance, Spiegel, & Klorman, 1981); people characterized as having weak voices are perceived as less informative and hiding information (Berger & Kellermann, 1989; Halberstadt, 1983). Marked intonation, strong melodic movements, and falling intonation at the end of the sentences are cues for floating and indefinite content (Helfrich & Wallbott, 1986).

Voice and Behavioral Intention

Marketing researchers such as Nelson and Schwartz (1979) have used consumers’ voice pitch as an index of their emotional response to commercial cues (advertisements, packages or brand names). But no marketing studies have yet investigated the effects of voice of the source on the consumers’ reactions. Very few phonological studies have investigated the effects of voice on receivers’ behavioral intent: expressive voices (Hall, 1980), rising intonation (Barath & Cannell, 1976), high intensity (Page & Balloun, 1978; Ruggieri & Frondaroli, 1989), and speech rate (Chaiken, 1979; Hall, 1980; Miller, et al., 1976) enhance persuasion.

The Elaboration Likelihood Model

Effects of Voice on Credibility

The phonological studies show clearly that voice characteristics affect the credibility and image of the source. Building on the model, we hypothesize that voice cues are more salient under low involvement, since consumers of low involvement are assumed to react to peripheral or nonmessage cues such as voice characteristics. At this point, we shall not consider the other potential effects of voice, i.e., on the attitudes toward the advertised service and on the intention to purchase, mainly because that literature is much more limited, which makes it difficult to elaborate hypotheses.

Effects of Credibility on Acceptance of Message

Credibility has been shown to have significant effects on attitude changes toward the position advocated by the message (e.g., Chebat, Larroche, Filatruault, & Watson, 1988; Craig & McCann, 1978; Sternthal, Phillips, & Dholakia, 1978; Woodside & Davenport, 1974).

Credibility is regarded as a multidimensional concept, involving expertise (e.g., Stoltenberg & McNeill, 1984), competence (e.g., Chebat, Filatruault, & Perrien, 1990), expertness (e.g., Petty, Cacioppo, & Goldman, 1981), and likability (e.g., Petty, Cacioppo, & Schumann, 1983). All these cues associated with the source are considered peripheral in the model, in the sense that they are processed by the receivers mainly under the low-involvement 'peripheral route' and not under the high involvement 'central
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route.' When receivers do not perceive a message to be worthwhile of mobilizing their cognitive energy (attention, information processing), they evaluate using nonmessage cues.

Effects of Content of Message on Intent to Purchase

The model predicts that to the consumers who are motivated to take the 'central route' of persuasion, the acceptance of message arguments is the key variable to produce receivers' persuasion (Petty, et al., 1983; Petty & Cacioppo, 1979, 1984; Petty, et al., 1981). As found by MacKenzie and Spreng (1992), the effect of brand attitudes on purchase intention is significantly stronger when the issue-involvement is high, that is, when consumers' motivation to process the message arguments is high. When issue-involvement is low, brand attitudes are more influenced by peripheral cues such as the attitudes toward the executional cues of the advertisement and are poor predictors of intent to purchase.

Hypotheses

The first hypothesis is derived from the phonological literature; however, since our hypotheses are inspired by the model, this relation should include 'involvement' as a moderator variable. Voice characteristics, being 'peripheral cues,' should play more significant roles under low than under high involvement.

H₁: Source credibility is affected by characteristics of voice significantly more under low than under high involvement. The second and third hypotheses are directly derived from the model. H₂: Source credibility affects the acceptance of the advertisement's content significantly more under low than under high involvement. H₃: Message content affects the intent to buy significantly more under high than under low involvement.

Method

Overview of the Methodological Approach

An experiment was designed with two levels of involvement, intensity and intonation of voice. In each of the experimental conditions, subjects were presented with an advertising message recorded on tape and designed for radio. A professional actor modified his voice to read the message so that the voice was either of low or high intensity and intonation. The two advertising messages on financial services were attributed to the same bank (a fictitious name was used), and they concerned services either with low or high personal involvement (use of Automatic Teller Machine or student loans).

Subjects

Two hundred seventy-nine university students in different sections of
the same business administration course during the same semester were randomly assigned to the four experimental conditions; 135 were assigned to the low-involvement condition, and 144 were assigned to the high-involvement condition. Only 221 questionnaires were fully completed. Each cell of the factorial research design contained an average of 27.6 subjects.

Experimental Procedure

A good quality radio-cassette player was used to play the appropriate message for subjects to simulate as closely as possible a radio advertisement. Each of the eight experimental groups was exposed to one message. In all groups, the objective intensity, i.e., the volume, was maintained at a constant and comfortable level. Once exposed to the experimental advertisement, subjects were asked to complete a questionnaire as described below.

Dependent Variables

Credibility was operationalized using two sets of four items each, one measuring "internalization" and the other "identification." Internalization was measured by four 7-point bipolar scales of "trustworthy," "honest," "competent," and "believes in what he says." Identification was measured by four 7-point bipolar scales of "prestigious," "same culture as myself," "pleasant," and "attractive."

Low Versus High Involvement Messages

Two messages were designed, one for the Low-involvement condition and one for the high-involvement condition. In both situations, the messages contained four arguments. The arguments were similar to those used by real promotional brochures of local banks. In the low-involvement message, subjects were invited to come to a branch of a certain bank (a fictitious name was used) to pick up their Automatic Teller Machine cards. In the high-involvement message, the subjects were also invited to come to a branch of the same bank to inquire about loans specifically designed for students. It was assumed that a student loan was much more involving than the card. This was confirmed by the manipulation check. The two messages for the low- and high-involvement services lasted approximately the same time (minimum duration: 55 sec., maximal duration: 62 sec.). They were as similar as possible from a linguistic point of view. They were composed of 168 and 163 words, respectively. The average word lengths were 4.7 and 4.8 letters, respectively. The average sentence lengths were 26.3 and 24.6 words; and the Gunning legibility indexes (Gunning, 1952) were 14.6 and 14.5. Further, the two messages had the same syntactic construction and complexity, with 24 propositions for the high-involvement message and 23 for the low-involvement one. The two messages were different only at the lexical level, since the low-involvement message focused on ATM cards, whereas the high-involvement one focused on student loans.
Manipulation Checks and Validity Measures: Pretest of Intonation of Voice and Intensity and Selection of Best Takes

Perceptual manipulation checks.—In a pretest, 20 students in phonetics served as judges to select the experimental recordings. They were exposed to 20 different versions of the messages: eight (for high and low intonation, high and low voice intensity, and high and low involvement) messages, which were recorded twice, i.e., in two different takes, two versions with neutral intonation and intensity for the low-involvement message and two neutral intonation and intensity versions for the high-involvement message. In all cases, the volume was maintained at a constant and comfortable level. Judges rated the 20 recordings on a phonetics scale of 1 to 10 to measure perceived intonation and intensity. Eight takes were selected, the intonation and intensity of which were either the lowest or the highest. In particular, the eight selected takes were rated significantly lower or higher than the neutral voice.

Checks of acoustical manipulation.—Acoustical measures were performed to confirm each experimental condition. The same sentence which appeared in the four advertising messages was computerized and analyzed in each of the eight selected takes with an SS31 speech signal analyzer. Results calculated in decibels show that high-intensity messages scored between 72 and 73 dB, whereas the low-intensity messages scored between 67 and 69 dB. In terms of intonation, the variation of pitch was much flatter in the four low-intonation conditions than in the high-intonation conditions. More precisely, the standard deviation of pitch varied between 6.83 and 9.40 Hz for the low intonation messages, whereas the high intonation messages varied between 13.01 and 20.63 Hz.

Checks of dimensions of dependent variables.—The ratings on the eight credibility variables were factor-analyzed, and two factors had eigenvalues greater than 1.0. The first factor explained more than three times as much variance as the second one (53% compared with 13%). The respective eigenvalues were 4.4 and 1.2. Internalization variables loaded on the first factor while the identification variables loaded on the second one. The respective Cronbach alphas were .81 for Internalization and .85 for Identification.

Involvement

The variable of involvement was validated by using the Zaichkowski (1985) Personal Involvement Inventory. The high- and low-involvement conditions were controlled in the following way. Each of the two groups was exposed either to the High- or the Low-involvement message. One group (n = 135) listened to an advertising message on Automated Teller Machines, and the other group (n = 144) listened to an advertisement on a program for student loans. The first group scored significantly lower on the inventory
than the second group. A test of differences between the two groups' mean scores was significant ($t_{zz} = -4.09$, $p < .01$).

**RESULTS**

The Structural Equation Program designed by Bentler (1989) in the BMDP statistical software package [Version 3.00 (C)] was used. The first set of structural equations reflects the three hypotheses to be tested under both low and high involvement: the source credibility is a linear function of the two voice characteristics ($H_1$), the attitude toward the financial service is a linear function of the source credibility ($H_2$), and the intent to buy is a linear function of the attitude toward the service ($H_3$). The set of relationships derived from these three hypotheses was tested under conditions of both high and low involvement, since all the hypothesized relations are moderated by involvement; under both conditions the adjusted goodness-of-fit indices were too low to be acceptable ($< .85$). The chi-squared comparing the original-vs-estimated variance-covariance matrices was too high ($p < .05$).

The model was then modified to take into account the highest residuals generated by the first model. A new model was then designed to reflect these residuals (see Table 1). The test of the effect of low vs high involvement on the model was done by imposing five constraints: the following five constrained relations should be identical under both levels of involvement. If rejected, the constraints are shown to be different under both levels of involvement, and conversely, if accepted, the constrained relations are not significantly different under low vs high involvement. The five tested relations are the effects of the two voice characteristics on source credibility ($C_{1a}$ and $C_{1b}$), the effects of voice intensity on the attitudes toward the advertised service ($C_2$), the effects of the source on the attitudes toward the service ($C_3$), and the effects of the attitudes toward the service on the intent to buy ($C_4$).

<table>
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<th>TABLE 1</th>
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<tr>
<td><strong>Structural Equation: Tested Model</strong></td>
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<td>Source = $a_1$ Intonation + $a_2$ Intensity + $e_1$</td>
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<td>Service = $a_2$ Source + $a_4$ Intensity + $e_2$</td>
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<tr>
<td>Intent = $a_3$ Source + $a_6$ Intonation + $a_7$ Service + $e_3$</td>
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A test of the constrained model showed that the goodness-of-fit (Bentler-Bonett's normed index of fit) was good (.96), the $C_2$ was low (7.81, $df = 8$, $p = .45$); the average standardized residuals were reasonably low (.038). However, three constraints had to be rejected to improve the model because their respective values of chi-squared were too high: $C_2 \chi^2 = 3.9$ ($p = .05$), $C_{1a} \chi^2 = 5.62$ ($p = .06$), and $C_{1b} \chi^2 = 6.24$ ($p = .10$).

The relations corresponding to these three constraints are significantly
different under high and low involvement, whereas the other constraints could be maintained as such, because the corresponding relations were not significantly different under high and low involvement ($p$ for $\chi^2 \geq .15$).

Once these three significant constraints were dropped, the model exposed on Table 1 was tested separately under low involvement and under high involvement. The main results are shown in Table 2.

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<th>TABLE 2</th>
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<tr>
<td><strong>SUMMARY OF STRUCTURAL EQUATION</strong></td>
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<td>Goodness of Fit Summary</td>
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<td>Independence Model chi square</td>
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<td>based on df</td>
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<td>Independence AIC</td>
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<td>Model AIC</td>
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<td>$p$ (chi square)</td>
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<td>Bender-Bonnett Normed Index</td>
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<td>Final Value of the Iterative Functions of Minimization</td>
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<tr>
<td>Residuals</td>
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<td>Average standardized residuals</td>
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<td>Highest standardized residuals</td>
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<tr>
<td>Parameters</td>
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<tr>
<td>Intonation of Voice $\rightarrow$ Source (b)</td>
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<tr>
<td>Voice Intensity $\rightarrow$ Source (b)</td>
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<tr>
<td>Voice Intensity $\rightarrow$ Service (a)</td>
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<td>Source $\rightarrow$ Service</td>
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<tr>
<td>Source $\rightarrow$ Intent</td>
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<tr>
<td>Intonation of Voice $\rightarrow$ Intent</td>
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<td>Service $\rightarrow$ Intent</td>
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</tbody>
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*Note.* — (a) Relation different under low- vs high-involvement conditions at $p = .05$; (b) relation different under low- vs high-involvement conditions at $p = .10$.

Under both low and high involvement, the models reproduce their respective original variance-covariance matrix well. The low-involvement model shows a chain of significant relations: Voice Intensity affects Credibility ($a = .297$, $t = 2.31$); Credibility affects Attitude toward the message ($a = .322$, $t = 1.98$), and Attitude toward the Service affects Intent to buy the service ($a = .498$, $t = 1.88$). In the high-involvement model, the last two relations are almost identical to their low-involvement counterparts (respectively: $a = .426$, $t = 2.49$, and $a = .560$, $t = 1.74$) and are statistically not different, since, as shown above, the test of the constraints on these two relations showed insignificant results. The effects of voice intensity on credibility are, however, significantly weaker in the high-involvement condition ($a = .198$, $t = 1.67$), since the test of significance on constraint $C_{ib}$ was $p$ for $\chi^2 = .10$. On the contrary,
the effects of intonation of voice on Source Credibility are significantly stronger in the high-involvement condition ($a = -0.15; t = -1.37$), since the test of significance on constraints $C_{1a}$ was for $\chi^2 = 0.06$. Figs. 1A and 1B show the two models and the parameters of the relations.

In Summary

The first hypothesis is partly verified. Since constraints $C_{1a}$ and $C_{1b}$ regarding the effects of intonation and intensity of voice on credibility are rejected, it may be concluded that the two voice characteristics affect the ratings of Credibility in a significantly different way under low and high involvement. The relationship between voice intensity and ratings of Credibility is stronger under low involvement, as expected. The relationship between intonation of voice and ratings of Credibility is stronger under high involvement, which is contrary to what was hypothesized from the model. The second hypothesis is rejected. The relationship between Credibility and ratings of Attitude toward the service is strong under both levels of involvement, whereas it was hypothesized from the model to be stronger under low invol-
volvement. The third hypothesis is rejected. The relation between Attitude toward the service and Intent to buy is strong under both levels of involvement, whereas, according to the model, it was hypothesized to be stronger under high involvement.

Two unexpected relations were found to obtain a high goodness of fit index. First, voice intensity affects the rating of Attitude toward the service significantly under low involvement. Second, intonation of voice affects the ratings of Intent to buy significantly under high involvement.

Discussion and Conclusions

Effects of Voice on Credibility

The two voice characteristics play an important role in the process of persuasion in advertising. As mentioned earlier, this relation is necessary to building a model showing a goodness-of-fit; in other words, however weak this relation may be, it is essential to soundness of the model's structure. As expected, they affect the ratings of Credibility; interestingly, their roles are not symmetrical: voice intensity is the key voice characteristic under low involvement, whereas both voice intensity and intonation are effective under high involvement. Voice intensity enhances the ratings of Source Credibility, as expected from the phonological literature (Bradac, et al., 1988; Brooke & Ng, 1986; Lind & O'Barr, 1979; Miller, et al., 1976); however, as predicted by the model, this relation is stronger under low involvement, which the phonological literature did not consider. Intonation of voice has an effect on ratings of Source Credibility mainly under high involvement which is contrary to predictions of the model. Possibly, voice intonation is a cue harder to decode than voice intensity and requires more attention so that it may have effects on ratings of Source credibility only under high involvement. As predicted by some studies on voice intonation, high voice intonation has here a negative effect on ratings of Credibility (Brooke & Ng, 1986; Helfrich & Wallbott, 1986).

Effects of Voice Intensity on Attitudes Toward the Advertised Service

Voice intensity directly affects the Attitude toward the service. This is an unexpected result. Voice intensity affects Attitude toward the service in opposing ways under low and high involvement, positively under low involvement and negatively under high involvement. Under low involvement, voice intensity, which enhances the rating of Source Credibility under low involvement, enhances also the Attitude toward the service. On the contrary, under high involvement, voice intensity has a negative effect. We suggest the following explanation: under low involvement voice intensity increases attention and makes the arguments more salient, and under high involvement the recipient's attention is split between the content of the message which in-
trinsically requires a high amount of cognitive activity and the voice intensity.

\textbf{Effects of Voice Intonation On the Intention To Buy the Advertised Service}

Unexpectedly, Intonation of voice contributes directly to the Intent to buy. The relation is not strong but is essential to the model's structural soundness. This result is interesting from two different viewpoints: first, from a theoretical viewpoint, because it shows the effect of an antecedent of Source Credibility on the persuasion process, as predicted from the phonological study by Barath and Cannell (1976) and second, from a practical viewpoint, because it shows the nonargumentative cues should be taken into account in the design of radio or TV advertising messages, which supports Ohanian's results (1991) that credibility may have direct effects on Intent to buy.

\textbf{Nonperipheral Cues}

As stated by Bitner and Obermiller (1985, p. 421) "many peripheral cues such as music, images, humor, may attract enough attention to elicit central processing of their own." That may also be the case with voice cues: voice intensity may raise consumers' attention under low involvement to the point that it becomes a 'central cue.' In addition to this, our results show that the two voice characteristics may play a role of their own on the attitudes toward the service and on the intent to purchase it \textit{without} being mediated by the perceived Credibility of the Source. This leads us to suggest that the effects of voice are not limited to the sole perception of the Source Credibility. They also play non-perceptual functions: voice intensity may arouse the receivers' level of attention under low involvement; intonation of voice may play an affective, almost seductive role on the Intent to buy. This study shows that so-called 'peripheral' voice cues do not play 'peripheral' roles.

\textbf{Relation with the Elaboration Likelihood Model: Confirmatory Results}

Our results both confirm and disconfirm what the model predicts. The model is confirmed in two ways. First, involvement proves to be a key moderator; the two paths of persuasion (under low and high involvement) are found to be structurally different. Second, more specifically, the voice characteristics play different roles under low- and high-involvement conditions. Under high involvement, consumers, whose cognitive activity is enhanced by the high involvement, i.e., student loans, process a higher quantity of nonverbal information since they are attentive to both voice cues. Under low issue involvement, i.e., the Automatic Teller Machines advertisement, consumers focus on one voice characteristic, i.e., intensity, which is more likely to enhance their low attention, since the topic is of low importance. This ex-
planation is intrinsically compatible with the model which postulates that cognitive activity increases with the level of involvement. However, we depart from the model to the extent that we apply to voice cues the kind of reasoning which is applied in it to arguments or verbal cues.

Some of our results contradict predictions from the model. First, the relationship between credibility and attitudes toward the advertised service is not significantly different under high versus low involvement. The model predicts that such a relation should not be significant under high involvement, where 'central cues' (mainly message cues) should be processed. Second, the relationship between attitudes toward the service and the intent to buy is not significantly different under both levels of involvement; however, it is hypothesized to be stronger under high involvement. Such contradictions with the model can be found in the literatures of advertising and social psychology. As for the first relation (between Credibility and Attitudes toward the advertised service), the following studies showed results also contradicting the model. Homer and Kahle (1990) found that the information about the Expertness of the source was "processed more as a central persuasion cue than as a peripheral information," whereas the source cue is a peripheral one. Mazursky and Schul (1992) concluded that, when involvement is high, the source provides "the context for the interpretation of the message," whereas the model predicts that only message cues should play such a role. Andrews and Shimp (1990) found that "peripheral route attitude change was determined by both message content and perception of the source," whereas only the source should play this role. In Chebat, et al. (1990) "credibility had an impact on message acceptance in situations of both low and high involvement." Similarly, Stoltenberg and McNeil's (1984) results indicated that highly involved subjects "exposed to a highly credible counselor expressed more agreement (with the message) than did highly involved subjects exposed to a moderately credible counselor," whereas the model predicts that the source credibility should not contribute significantly to changes in attitude under high involvement. Cole, Ettenson, Reinke, and Schroder (1990, p. 235) also found results at odds with the model. In two studies, even under low involvement, only main effects of the quality arguments were found; in their third study, an effect for expert source was found "only in the high involvement situation."

As for the second relation on which our results contradict the model, i.e., the intent to buy, the existing literature shows similar contradictions. Manfredo and Bright (1991) found that even under high involvement, source credibility had a direct effect on the behavioral intention to change. Several articles by Gotlieb and his colleagues (Gotlieb, 1990; Gotlieb & Sarel, 1991; Gotlieb, Schlacter, & St.-Louis, 1992) found that under high involvement, source credibility has direct effects on the intention to buy goods.
once their price is reduced. In particular, Gotlieb, Schlacter, and St-Louis (1992) found that under high involvement, consumers were less sensitive to price reduction if the credibility is high rather than low. In another study on reduction of price, Gotlieb (1990) concluded from his results that, “when high involvement was activated by the price saving message, the credibility of the source had an important effect on the attitudes.”

Temporal Sequence of Radio and TV Cues

Two explanations for the results contradicting the model can be proposed, both related to the fact that radio and TV advertisements are processed in a temporal sequence differently from print. Most advertising studies using the model as a theoretical background employ printed advertisements. These printed advertisements are perceived by consumers in a global way. They may instantly perceive the credibility of the source (prestigious, attractive, competent, or the opposite) and the relevance of the message. The perception of radio or TV advertisements follows a different pattern, since the message is a temporal sequence of cues. First, cues for credibility of the radio or TV advertisements are processed along with message cues. The credibility of unknown sources is assessed by the strength of their arguments; the quality of the arguments affects the credibility. The other direction for this relation is possible as well. Heesacker (1986) showed that “credibility significantly affected the degree to which subjects’ attitudes reflected argument quality.” The interactive and reciprocally reinforcing effects of credibility on assessment of arguments by consumers are obvious when the advertisements are a temporal sequence of cues as in the case for radio. Consumers exposed to radio advertisements assess arguments’ strength and source credibility in two simultaneous sequences of cues (message cues and voice cues). It is then very likely that these two sets of cues are interacting and reinforcing each other in a way which contradict the model. Whereas the model predicts that consumers assess either credibility (under low involvement) or arguments’ strength (under high involvement), consumers exposed to radio advertisements would rather assess them together in such a way that they jointly and positively affect the attitudes toward the advertised object.

Second, as for the level of involvement associated with the product or services advertised, cues in radio advertisements allowing consumers to assess them are likely to be processed through time differently than printed advertisement. Consumers cannot assess the importance of the message at the very inception of the advertisement. Most radio or TV advertisements do not start with a clue which elicits a choice between central-versus-peripheral routes before the consumers are exposed to the content of the advertisement. It is reasoned that information stored in the short-term memory by
consumers exposed to radio or TV may be rehearsed if consumers think that information is worthwhile. MacDaniel and Vastal (1975) showed the key role played by high credibility in this rehearsal process: high credibility helps individuals retain more information. Heesacker, Petty, and Cacioppo (1983) found that “increasing source credibility can enhance message-relevant thoughts for subjects who typically do not scrutinize message content.” In the case of radio and TV advertisements, high credibility and high involvement may then interact in a way which might eventually contradict the model's predictions: high credibility helps the recall of message cues stored in the short-term memory. These cues are processed in the central-route since the message is perceived as worthwhile. This may bring about reciprocally reinforcing effects between credibility and involvement on changes in attitude. The fact that we found significant effects of credibility on the attitudes toward the advertised service even under high involvement can be explained by the rehearsal of information stored in the short-term memory, where high credibility may have enhanced the rehearsal of advertisements perceived as relevant to consumers. This rehearsal of short-term memory information is less likely to occur for print advertisements, since consumers may process the advertisements cues through either central or peripheral routes according to relevance perceived before being exposed to the very content of the message itself. For printed advertisements such reciprocally reinforcing effects of involvement and credibility do not exist since consumers use either the central route in which credibility plays a minor role or the peripheral route in which involvement is low. Such differences over the time sequence of the media (print vs radio vs TV) should be studied in more detail. In their meta-analysis of 47 advertising studies, Brown and Stayman (1992) introduced the medium as a moderator variable, which was not done in the studies they reviewed. The medium was introduced in their meta-model ex post facto as a methodological dimension of the reviewed studies. Notably, voice is not even mentioned by the authors as a potential variable to be studied in further studies. The present study points out that such a lack of attention to the specific characteristics of the media may render questionable the generalizability of studies using printed advertisements. As already pointed out (e.g., Brown & Stayman, 1992), this medium enhances consumers' cognitive activity, but the temporal aspect of the sequence through which the information is processed has yet to be investigated, and its consequences on the process of persuasion have to be clarified.

Explanation Based on Kahneman's Theory

Instead of the dichotomy (central-vs-peripheral routes) suggested by the model, we rather lean toward Kahneman's (1973) proposition that individuals' goals and intentions change the way in which they allocate their cogni-
tive energy and capacity to competing mental activities. Kahneman's predictions were supported in Stiff's study (1986) showing first a positive linear relationship between involvement and the effects of central message cues on attitudes and, second, a curvilinear relationship between involvement and the effects of credibility on attitudes. Whereas the linear relation from Stiff confirms the model's prediction that the higher the involvement the more important on change of attitude the effects of arguments contained in the message, the curvilinear relation shows a different picture. Credibility affects attitude change almost symmetrically under high levels of involvement. When involvement is high, the cues about credibility are also processed, since the cognitive activity is high and reflects the allocation of cognitive resources to a decision-making process involving more risks. Our results confirm this relation. Under high involvement, voice characteristics are processed to assess source credibility and affect the assessment of the advertised service and the intent to purchase it. Instead of the dichotomy proposed by the model, i.e., consumers process either arguments or credibility, it is more likely that consumers tend to process both simultaneously and put more emphasis on central cues or on peripheral cues according to what they consider their optimal allocation of cognitive energy. Moreover, they may consider a syntactic combination of the two kinds of cues. The consistency of cues for both credibility and argument is also a source of information for consumers who want to lower the dissonance in their decision making. The processing of both cues is all the more likely if they are processed simultaneously as is the case in radio advertisements for message and voice cues.

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APPENDIX

Technical Note: Voice Cues in the Recording

Following the "matched-guise" sociolinguistic technique (Lambert, Hodges, Garder, & Fillebaum, 1960), a professional male actor was directed by the first author to produce four different voices for each of the two (low- and high-involvement) advertising messages. The actor was trained to speak loud or low (manipulation of intensity) and to speak with or without pronounced melody in his voice (manipulation of intonation) according to the experimental design. A professional technician of the university's audiovisual services was instructed to stabilize the VU-meter level within the zero zone to keep a constant and comfortable recorded voice intensity.

Five different versions of each message were taped in a professional recording studio. In addition to the four experimental conditions, a fifth version was also recorded with natural intensity and a neutral-intonation of voice. Each of these five versions was recorded twice to make sure that at least one of the two versions was satisfactory.