The Perception of Vocal Emotion By Canadian Anglophones and Francophones of White- and Blue-Collar Status

by

Constance R. Cohen

A thesis
presented to the University of Manitoba
in partial fulfillment of the
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Abstract

This research compares the perception of vocal emotion by white- and blue-collar francophones and anglophones. Previous literature reported status differences in other nonverbal modalities, and vocal differences between white- and blue-collar workers in neutral situations. Differences in vocal expression between English and various other languages have been reported, as well as between anglophones and francophones in the gestural channel. Therefore, it was hypothesized that raters would identify emotion more accurately within than across language and status groups. It was also predicted that francophones and white-collar raters would be more accustomed than anglophone and blue-collar raters to lively speech and would perceive it as lower in arousal. Subjects rated filtered samples of emotion by the four groups of interest. The data was analyzed in two repeated measures Anovas. The hypotheses were not supported. Anglophones were rated more accurately and as more aroused than francophones by raters of both languages. The accuracy with which the four emotions were identified differed for each group of speakers. For each group, the emotion with the highest intensity rating was the most accurately perceived. The results are discussed in terms of the nonredun-

the recording or prerating of samples. The staff of the language immersion programs who permitted me to use class time to run my study, the students who so kindly participated, and the Manitoba Mental Health Research Foundation which funded this project are gratefully acknowledged.

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dancy theory of communication which suggests that affective behaviours covary inversely across channels. The greater accuracy and intensity ratings of anglophones might, therefore, be due to a cultural tendency toward greater expressivity in the vocal channel, while francophones may tend to favour the gestural channel. It is also suggested that anglophones might speak with more authority or intensity because of their more privileged position in society. It is suggested that the physiological factors affecting vocal emotion may be greater than in other nonverbal modalities. Cross-group rating differences may only be found between groups that are more dissimilar than those in this study.

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Appendix page

Introduction

Communication is a complex, multileveled process. Frequently studied channels of interpersonal communication are the verbal (the content of what is said), vocal (the way something is said) and kinesthetic (physical correlates of communication). Each of these levels of communication can convey information about the emotional state of the communicator. Much research has been done on the identification of speaker emotion in isolated channels (Davitz & Davitz, 1959; Soskin & Kauffman, 1961; Starkweather, 1956) or with the channels combined either congruently or incongruently (Bugental, Kaswin, Love & Fox, 1979; Mehrabian & Wiener, 1967). Appendix A describes the research and findings in these areas.

The present study was concerned with the cross-cultural interpretation of emotion conveyed by the vocal channel of speech. The vocal channel, or quality of voice, includes such features as pitch, stress, intonation, rate of speech, harshness, and raspiness. In particular, this research investigated vocal differences in the communication of emotion between French- and English-speaking Canadians of white- and blue-collar status.

Misunderstandings can stem from a nuance missed or attributed when unintended, such as an ironic message taken literally or a warning tone of voice unnoticed. Therefore, it is important to know if these signals are correctly interpreted across social status levels and across language groups. Indeed, the literature reviewed in Appendix A suggests that there may be subtle but consistent differences across these groups. Such differences could exacerbate the problems which frequently occur in inter-group communication.

It has been suggested that the vocal characteristics available to a group for the communication of emotion depend upon the phonemic features of the language spoken (Hymes, 1961; Key, 1975; Williams & Stevens, 1969; 1972). A phoneme is the smallest unit of speech which can distinguish one word from another within a language. For example, in English the distinction between voiced and voiceless sounds, such as 'b' and 'p', 'z' and 's', and 'd' and 't' is phonemic, as can be seen from pairs of words like 'bin' and 'pin', 'zip' and 'sip', and 'bid' and 'bit'. In some languages, such as Chinese, pitch is phonemic and changing the pitch of one syllable can result in a different word (Eady, 1982). When a feature of speech is phonemic, or linguistically restrained, it is less free to carry emotional meaning because a shift to imply emotion could change the meaning of the word. Starkweather (1969) suggested that for any feature of

speech there is a "possible inverse relationship between linguistic restraint... and the ability to express emotion. It is, indeed, true that in English at least, pitch, loudness, and speech rate are not linguistically restrained and are, therefore, free to indicate speaker identity and emotional state as they seem to do" (p.315). In a language such as Chinese, where pitch is phonemic, it would be less free to vary as a communicator of emotion.

Regardless of culture, people are born with the same potential range of verbal and vocal features available to them (Chomsky & Halle, 1968). Some of these features will ultimately become part of their communication system; others will be lost (Stampe, Note 1). If, for any given feature within a language, there is, as Starkweather suggests, an inverse relationship between linguistic restraint and the ability to express emotion, then one might assume that speakers of languages with similar linguistically restrained features would have a similar range of features 'left over' which might be used for the expression of emotion. One might hypothesize that the more similar the linguistic features of two languages are (the features which give cognitive meaning to an utterance), the more similar are the paralinguistic or vocal features (those which give cues to the emotional state without affecting the cognitive meaning). However, although the same vocal features may be available for the communication of emotion in two different languages

or cultures, they need not necessarily be used in the same way (Bolinger, 1972). For example, in two languages in which pitch was not phonemic, a higher pitch in one might indicate anger, in the other, fear. Even in two languages with vocal features that are used similarly, there may be differences in how much of a change is needed to convey meaning. For example, the degree of change in pitch necessary to communicate anger may differ in two language groups that both employ rises in pitch in this way. Those whose language has attuned them to very large rises in pitch might not identify the anger in a communication by someone to whom very small changes are communicative. Similarly, the speaker attuned to very slight rises in pitch might overestimate the degree of arousal of the speaker whose language requires large rises in pitch to communicate emotion. This supposition is supported by the research of Thayer (1980) on facially-expressed emotion, which suggests that adaptation levels are developed against which the intensity of subsequently-viewed emotions are judged.

Evidence for social class differences in the vocal communication of emotion

Several lines of research converge to suggest that there may be social class differences in the vocal communication of emotion. Brown (Note 2) and Brown and Lambert (1976) demonstrated what they labelled 'social status mark-

ers' in speech. They found that French-speaking Canadians of differing social status levels could be accurately rated as white- or blue-collar workers on the basis of speech samples by both other francophones and by American raters who spoke no French. The francophones' ratings would presumably have been influenced by status pronunciation or articulation, as well as by vocal quality. However, the Americans' ratings would have been based on vocal qualities alone. The francophone judges also rated the speakers on several different semantic differential scales (Brown, Note 2). The factor which tended to differentiate white- and blue-collar groups was 'competence' and included such traits as 'intelligent', 'confident', and 'ambitious'. In a further series of studies, Brown and his associates (Brown, Strong & Rencher, 1973, 1974, 1975; Smith, Brown, Strong & Rencher, 1975) found that rate of speech, pitch, and intonation are the vocal variables which determine perceptions of competence, the factor previously found to differentiate white- and blue-collar workers. They found, by electronically manipulating recordings, that decreasing rate or intonation, or increasing pitch, resulted in lowered ratings of competence. Since pitch, rate, and intonation are involved in the vocal communication of emotion (Scherer, 1974; Williams & Stevens, 1969, 1972), it is possible that the vocal communication of emotion also differs across social status levels.

Social class differences in other nonverbal communication channels have been reported. Middle-class children were found to maintain greater distance between themselves during conversation than lower-class children (Aiello & Cooper, 1972; S. Scherer, 1974). Higher social class children were more accurate decoders of facially-expressed emotion than were lower social class children (Gates, 1927a). Members of different occupational groups were found to differ in their ability to decode emotion in various channels (Buck, 1976; Rosenthal, Hall, Dimatteo, Rogers, & Archer, 1979). Males in occupations requiring nuturant, expressive, or artistic behaviour scored higher than those in other occupations (Rosenthal et al., 1979).

Children and adults of lower- and middle-class status have been shown to respond differently to incongruent verbal-vocal communications (Brooks, Brandt & Wiener, 1969; Kashinsky & Wiener, 1969; Brooks, Note 3). For the lower class subjects, affect in the vocal channel appears to function as a signal, directing the listener to attend to the verbal component. Tone does not appear to function in this way for middle-class subjects. When the performance of middle-class subjects on a simple learning task did vary according to verbal-vocal combination, and it frequently did not, it appeared that the incongruent verbal and vocal messages were cancelling each other out. That is, it appeared that the opposing valences of the two levels were noted, re-

sulting in responses to the combined message as if it were neutral.

In short, it has been reported that social status groups differ in their utilization of verbal-vocal combinations, in the communication of affect in other nonverbal modalities, and in pitch, rate of speech, and intonation in neutral situations. Further, it has been shown that accuracy of communication improves with increased familiarity with group norms (McCluskey, Niemi & Albas, 1978) and with acquaintance with encoder (Zuckerman, Lipets, Koivumaki & Rosenthal, 1975). Because people tend to socialize more within than across social status levels (Argyle, 1972a), communication is probably more accurate within social status levels.

Language-group differences in the vocal communication of emotion

Vocal communication has also been shown to be more accurate within than across language groups (Albas, McCluskey & Albas, 1978; Beier & Zautra, 1972). Rosenthal et al. (1979) administered their test of nonverbal sensitivity, consisting of samples of an American's nonverbal communication in various channels individually and combined, to people from over twenty different countries. They found that people from countries which most resembled the United States in terms of modernization and use of communication media scored the

highest. However, on the whole, scores were high enough to provide some evidence for an intercultural component. This suggests that differences between groups may sometimes be quite subtle. It may be that they take the form of differences in perceived degree of arousal, rather than, or in addition to, the less accurate identification of emotion.

Although the vocal communication of emotion between English- and French-speaking Canadians has not been previously studied, it has been found that the kinesthetic communication of these groups differs (LaCroix & Rioux, 1978; von Raffler-Engel, 1975, 1978). Further, members of each group tend to rate both vocal and gestural behaviours somewhat differently, with francophones rating samples as more nervous and unpleasant than do anglophone judges (LaCroix & Rioux, 1978). Differences in interpersonal spacing preferences have also been reported, with francophones tending to stand closer to other francophones than anglophones to other anglophones (Albas & Albas, Note 4).

The present study, investigating differences in the vocal communication of emotion between French- and English-speaking Canadians of white- and blue-collar status, was specifically interested in the following: Do the different groups use different vocal patterns to express the same emotions? Can judges from the different groups identify vocal patterns correctly? Do judges from the two cultures differ

in their interpretation of the degree to which the speaker is experiencing the emotion communicated (how angry, sad, etc., the speaker is)?

Hypotheses

Differences have been found in the vocal expression of emotion between many different pairs of languages (e.g., Beier & Zautra, 1972) and have also been reported in the kinesthetic communication of bilingual French- and English-Canadians (LaCroix & Rioux, 1978; Von Raffler-Engel, 1975, 1978). Therefore, it was hypothesized that there would be differences in the vocal expression of emotion in English and French such that:

1. Subjects would identify emotions more accurately in their first language than across languages.

Paralinguistic features have been found to differentiate white- and blue-collar speakers in neutral situations (Brown & Lambert, 1976). Therefore, it was hypothesized that there would also be differences in the vocal expression of emotion such that:

2. Subjects would identify samples more accurately when they were by speakers of the same social status than across status levels.

In many of the cross-language studies, filtered speech samples were played to raters who didn't know they were hearing two different languages. For example, Albas et al. (1978) played filtered samples of Cree and English to Cree

and English-speaking raters and found that each group was more accurate when rating speakers of its own language group. However, if listeners have any familiarity with the second language, then knowing which language is being spoken may allow them to accommodate. It was hypothesized that:

3. Subjects would identify emotions more accurately when the language spoken was identified.

As in the popular stereotypes, French-Canadians tend to be more open and expressive than English-Canadians (LaCroix & Rioux, 1978). Therefore, French-Canadians might be familiar with more varied or dramatic vocal expressions and not consider them evidence of high arousal, but rather the tone of 'normal' discourse. It was hypothesized that:

4. Given the same vocal stimulus, francophone subjects would perceive emotional arousal to be lower than would anglophone subjects.

In neutral situations, white-collar workers and/or people rated as competent were found to have quicker rates of speech and greater range of intonation than blue-collar workers and those rated less competent (Brown et al., 1973, 1974, 1975; Frender et al., 1970; Smith et al., 1975). Therefore, raters from white-collar families should be more accustomed to quicker, more varied speech. It was hypothesized that:

5. Given the same vocal stimulus, white-collar raters would perceive emotional arousal to be lower than would blue-colar raters.

Method

Participants

Participants were 77 anglophone- and 88 francophone-Canadian students enrolled in French and English summer immersion programs* sponsored by the federal government in 1981. The social status of the participants was determined by their fathers' occupational level. White-collar status was defined as having a father employed in categories A or B in Brown and Lambert's (1976) grouping of Blishen occupational levels 1 and 2 (Blishen, 1964 & 1971). Blue-collar status was determined according to Brown and Lambert's categories C and D, corresponding to Blishen levels 3 to 7. The Blishen scale ranks Canadian occupations on the basis of years of education and income associated with them. Students whose fathers' occupational status could not be ranked according to the Blishen scale were omitted from the analysis. This eliminated seven anglophones and five francophones from the study. The remaining participants fell into the following categories: 46 English-speaking white-collar,

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* The programs were offered at the Universities of Manitoba, Calgary, Winnipeg, Quebec (in Chicoutimi), Alberta (in Edmonton and Chicoutimi), and Toronto (Scarborough College), Laurentian University, York University, and St. Boniface College.

24 English-speaking blue-collar, 30 French-speaking white-collar, and 53 French-speaking blue-collar subjects or raters.

Speech samples

The speech samples used were obtained from two male speakers from each of four groups (white- and blue-collar anglophone and francophone Canadians). Male speakers were used because the occupational scales are based on the assumption that, in families in which both husband and wife work, it is the husband's occupation that determines the family's social status (Blishen, 1964). White- and blue-collar status were again determined according to Brown and Lambert's (1976) categories.

The eight speakers whose samples were used were chosen from a larger number of speakers who volunteered to record speech samples. All speakers were asked to imagine situations in which they would feel loving, angry, sad, and happy, and to convey these emotions in their first language in the case of bilingual speakers, in sentences of four to eight words of their choosing. Each speaker was allowed to make as many attempts at expressing a particular emotion as he needed to arrive at one which he felt sounded natural.

The first selection criterion applied to the speech samples thus obtained was whether the speaker sounded like a

member of his occupational-status group. Five white-collar judges listened to the recorded samples and indicated whether the speaker sounded white- or blue-collar*. Anglophone judges listened to the English samples and francophones judged the French. A speaker had to be correctly designated as either white- or blue-collar by at least four out of five judges in order to be included in the second stage of the screening process. Those who did the screening of the samples, and the speakers themselves, were not chosen in a random or consistent fashion, but were casually recruited from among acquaintances, when possible, or from among the employees of several large organizations when necessary to fill out a group.

Although the criterion by which a sample was said to represent a particular emotion was the intent of the speaker, the justification for which is discussed in Appendix A, a check was made on how natural the samples sounded. This was the second step in the sample-selection process. Samples from each social-class language-group combination were

* It was initially planned to retain a speaker's samples only if his status was correctly identified by judges of both white- and blue-collar status. However, it was found that the blue-collar judges were not able to make the discrimination at a much better than chance level of accuracy. Because the judges did not all rate the same samples (new ones were added as others were eliminated), and because some judges rated more samples than others, a direct comparison of the accuracy of blue- and white-collar judges could not be made. However, of a total of 107 judgements made by white-collar judges, 92 were correct, a hit rate of 85.9%. Blue-collar judges were correct on 31 out of 53 judgements, or 58.5% of the time.

played to five representatives of the same group. These representatives were aware of the purpose of the study. They were asked to rate how naturally each emotion was conveyed on a 5-point scale ranging from 1, not at all natural, to 5, completely natural. Only samples which received ratings of three or above by all raters were retained. The occupations of the speakers selected for the study were as follows: the white-collar anglophone speakers were an art-teacher and a clinical psychologist, the blue-collar anglophones were a bus-driver and a firefighter, both white-collar francophones were French professors, and both blue-collar francophones were firefighters.

Thus, screening ensured that the speakers whose samples were used sounded representative of their occupational-status group and that the samples conveyed the intended emotions in a natural manner.

The speech samples were recorded in random order* on a MCI two-track recorder, with 20-second pauses between them. To render the semantic content of the samples unintelligible, they were passed through a low-pass filter (a Soundcraft Series 1624 console was used), removing frequencies above 450 cycles per second (Soskin & Kauffman, 1961). The tape of the filtered samples was then rerecorded in four

* Randomization was restricted only by the requirement that no more than two samples of the same emotion, by speakers of the same language-group, or of the same social status, could appear in a row.

different ways. Two tapes were made, a French and an English version, on which the samples were introduced to the listener by number. On the remaining two tapes, one in English and one in French, it was announced, after the sample number, which language would be spoken next. There were thus four tapes, English and French versions of identified and nonidentified speech samples. Each tape consisted of 32 filtered speech samples (two speakers from each of four groups conveying four emotions each).

Rating forms

Participants received booklets in which to record their responses. On the cover of the booklet they were asked to indicate their sex, age, language spoken in the home, occupation, and parents' occupations. A copy of this questionnaire can be found in Appendix B. On the top of each page of rating forms the following instructions were printed: "Indicate, beside the name of the emotion expressed, the extent to which the speaker was feeling that way." This was followed by lists of the four emotions, printed next to 5-point intensity scales, ranging from 1, very slightly intense to 5, very intensely. A copy of these forms is presented in Appendix C. French translations of the forms were made for the French-speaking participants.

Procedure

The study was run in groups, the sizes of which depended upon the structure of the classes. The study was introduced by a fluently bilingual speaker who addressed each language group in its first language. Detailed instructions were presented on tape. Participants were told that the study was concerned with the communication of emotion by speakers of different languages. It was explained that the speech samples they would hear would sound muffled in order to allow them to concentrate on the feelings expressed, without being distracted by the words. The tapes with the language-identified samples were prefaced with the remark that raters would be told whether a given sample was in French or in English. The tape with the nonidentified samples was introduced with a statement that the samples which followed were all in the raters' first language. Complete instructions are presented in Appendix D.

The order of presentation of identified and nonidentified samples was counterbalanced. To control for practice effects, the first tape heard by a group was prefaced by three warm-up samples, the ratings of which were not included in the analysis. The first practice sample for each group was in its first language. The practice samples were language-identified or not to match the condition to which the listeners were initially exposed.

Summary of the research design

The research design is summarized in Table 1.

TABLE 1

Summary of the research design

	SPEECH SAMPLES*							
	Anglophone				Francophone			
	White-Collar		Blue-Collar		White-Collar		Blue-Collar	
	I AHLS	N AHLS	I AHLS	N AHLS	I AHLS	N AHLS	I AHLS	N AHLS
Anglophone								
White-Collar								
Blue-Collar								
RATERS								
Francophone								
White-Collar								
Blue-Collar								

*I = identified, N = nonidentified,
A = anger, H = happiness, L = love, S = sadness

In each cell, raters responded to two speech samples (one emotion by two speakers). The criterion of accuracy for the identification of emotion was the intent of the speaker. The intensity rating was a comparative rating on a 5-point scale, ranging from 1, very slightly intense, to 5, very intensely.

Results

An initial check was made to determine whether there were any effects due to gender of rater. As there were none, the data from male and females subjects was analyzed together.

Analyses pertaining to the accuracy hypotheses

For the first analysis, the accuracy of identification of emotion, the unit of analysis was each rater's score per cell. Because raters responded to two speech samples per cell (see Table 1), the maximum score per rater per cell was 2. Missing ratings were scored as incorrect responses on the grounds that raters presumably left them blank because they did not know the correct response. Approximately 17% of the subjects had one or more missing ratings. The data were analyzed in a 2 x 2 x 2 x 2 x 2 x 4 repeated measures analysis of variance (language of rater x status of rater x language of speaker x status of speaker x identification/ nonidentification of language x emotion). The complete results of this analysis are presented in Appendix E. Because of the large number of factors compared, it was decided that a more stringent level of significance than $P < .05$ should be set. Therefore, a significance level of $P < .01$ was established for all of the analyses.

Hypothesis 1, that raters would identify emotions more accurately in their first language than across languages, was tested by the language of speaker by language of rater interaction (see Table 2). It was not significant ($F = 3.07$, $df = 1,149$, $P \leq .08$).

TABLE 2

Mean accuracy scores for anglophone and francophone raters rating anglophone and francophone speakers*

	Speakers					
	Anglophone		Francophone		Marginal	
Raters	Mean	S.D.	Mean	S.D.	Mean	S.D.
Anglophone n=70	.98	.20	.67	.17	.83	.13
Francophone n=83	.90	.21	.69	.19	.80	.14
Marginal N=153	.94	.21	.68	.18	.81	.17

*Maximum score per cell = 2.

Hypothesis 2, that raters would identify emotions more accurately when they were by speakers of the same occupational status than across status levels, was tested by the status of speaker by status of rater interaction (see Table 3). The hypothesis was not supported ($F = 0.00$, $df = 1,149$, $P \leq .95$).

TABLE 3

Mean accuracy scores for white- and blue-collar raters rating white-and blue-collar speakers*

	Speakers					
	White-Collar		Blue-Collar		Marginal	
Raters	Mean	S.D.	Mean	S.D.	Mean	S.D.
White-Collar n=76	.80	.20	.82	.16	.81	.14
Blue-Collar n=77	.80	.16	.82	.19	.81	.13
Marginal N=153	.80	.18	.82	.18	.81	.17

*Maximum score per cell = 2.

Hypothesis 3, that emotions would be identified more accurately when the language spoken was identified, was tested by the main effect for the identified/nonidentified factor. It was not significant. The mean accuracy score on language-identified samples was .80 (s.d. = .18), versus .82 (s.d. = .18) on nonidentified samples ($F = 1.19$, $df = 3, 447$, $P \leq .08$).

Analyses pertaining to the intensity hypotheses

For the intensity of emotion ratings another 2 x 2 x 2 x 2 x 2 x 4 repeated measures analysis of variance was done. Emotions were again included as a factor because ratings of intensity could be a factor of not only speaker and rater characteristics but also of which emotion was being conveyed. If an average were taken across emotions in each cell, differences could be lost.

In the intensity analysis, each cell again contained two speech samples (2 speakers x one emotion). The sum of each participant's ratings of the two samples , each on a 1 - 5 scale, was the unit of analysis. Therefore, the maximum score per rater per cell was 10. Participants who did not indicate an intensity rating for each sample were excluded from this analysis, resulting in smaller sample sizes than in the first analysis. (In the first analysis, missing ratings were scored as incorrect responses.*) The resulting

* Missing data had to be handled differently in the intensity analyses because of the fact that the unit of analysis was the sum of the ratings on the two like speech samples. If one of the two samples had not been rated it could not be counted as a zero rating of intensity because that would have falsely created a low summed rating for the combined stimuli. For example, assume that a participant rated the French white-collar anger samples with a 4 and a 5 in intensity and rated one of the English white-collar samples with a 4, omitting the other because he could not identify it (the identification of the emotion and rating of intensity were done simultaneously). If the missing response were counted as 0, it would create a difference in intensity ratings of 9 to 4, which would not reflect the intent of the rater. Various ways of weighting the single ratings in pairs where one was missing were consid-

cell sizes were: 35 white-collar anglophones, 22 blue- collar anglophones, 22 white-collar francophones, and 48 blue-collar francophones. The complete results of this analysis are presented in Appendix F.

Hypothesis 4, that francophone raters would perceive emotional arousal to be lower than would anglophone raters, was tested by examining the main effect for language of rater. The hypothesis was not supported. The mean intensity rating by francophone raters was 6.10 (s.d. = .83), versus a mean of 6.18 (s.d. = .10) by anglophone raters ($F = 0.64$, $df = 1,123$, $P \leq .42$).

Hypothesis 5, that white-collar raters would perceive emotional arousal to be lower than would blue-collar raters, was tested by examining the main effect for status of rater. This hypothesis was also not supported. The mean intensity rating by white-collar raters was 6.13 (s.d. = .97), versus a mean rating by blue-collar raters of 6.16 (s.d. = .86) ($F = 0.16$, $df = 1,123$, $P \leq .70$).

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ered and rejected as being either too unwieldy or creating too inaccurate a result. Unfortunately, the computer program used, BMDP - P2V (Dixon & Brown, 1977) did not allow the use of incomplete cases, so subjects with even one missing rating had to be excluded from this analysis.

Post hoc analyses

Accuracy of identification.

Although none of the hypotheses was supported, there were some significant results. It was found that anglophone speakers were rated most accurately overall, as demonstrated by the main effect for language of speaker ($F = 128.74$, $df = 1,149$, $P<.001$). The mean accuracy rating obtained by anglophone speakers was .94 (s.d. = .21) as compared to a mean rating of .68 (s.d. = .18) for francophone speakers.

In previous studies, it has been shown that some emotions are more frequently correctly identified than others (e.g., Davitz & Davitz, 1959a). Also, the relative ease with which the different emotions are identified (how 'obvious' an emotion is) varies in different languages (Beier & Zautra, 1972; Kramer, 1964; St. Martin, Note 5). In the present study, the different emotions were identified with differential accuracy, as demonstrated by the main effect for emotions ($F = 47.54$, $df = 3,447$, $P<.001$). However, the order of accuracy with which emotions were communicated differed for each language-status group of speakers. The language of speaker by emotion interaction ($F = 36.06$, $df = 3,447$, $P<.001$), status of speaker by emotion interaction ($F = 104.44$, $df = 3,447$, $P<.001$), and language of speaker by status of speaker by emotion interaction ($F = 33.71$, $df = 3,447$, $P<.001$) were all significant.

Simple simple main effects were calculated to determine whether, within each language-status combination of speakers, the effect for emotions was significant. A simple simple main effects analysis is a post hoc test that can be applied to interactions which the omnibus test has shown to be significant. It is used to determine which differences in the interaction are significant (Kirk, 1968). It was established that for each group of speakers, the differential accuracy of identification of emotions was significant (see Tables 4 and 5). The descending order of accuracy of identification of emotions for each group was as follows: white-collar anglophones - anger, sadness, happiness, and love ($F = 39.9$, $df = 3,447$, $P<.001$): blue-collar anglophones - anger, sadness, love, and happiness ($F = 62.7$, $df = 3,447$, $P<.001$), white-collar francophones - happiness, anger, sadness, and love ($F = 39.6$, $df = 3,447$, $P<.001$); blue-collar francophones - sadness, love, anger, and happiness ($F = 70.0$, $df = 3,447$, $P<.001$).

Newman-Keuls analyses (Winer, 1962) were calculated to determine which differences in accuracy were significant within each language-status combination.

For white-collar anglophones, anger was rated significantly more accurately than the other emotions ($P<.01$). Love was rated significantly less accurately than each of the other emotions ($P<.01$).

TABLE 4

Mean accuracy scores on the four emotions* for each language-status group of speakers**

	White-Collar Anglophone		Blue-Collar Anglophone		White-Collar Francophone		Blue-Collar Francophone		Marginal	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A	1.25	.53	1.41	.51	0.81	.56	0.63	.52	1.03	.30
H	0.87	.61	0.64	.46	1.03	.53	0.19	.32	0.68	.28
L	0.58	.50	0.76	.53	0.44	.46	0.81	.60	0.65	.31
S	0.92	.53	1.08	.56	0.49	.49	1.06	.48	0.89	.30
Marginal	0.91	.28	0.97	.27	0.69	.26	0.67	.23	0.81	.14

*A = anger, H = happiness, L = love, S = sadness

**Maximum score per cell = 2.

TABLE 5

A comparison of accuracy scores on the four emotions within each language-status group of speakers

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F
White-collar anglophone	70.68	3	23.56	39.9**
Blue-collar anglophone	110.93	3	36.98	62.7**
White-collar francophone	70.08	3	23.3&	39.6**
Blue-collar francophone	123.88	3	41.29	70.0**
Error (pooled)		447	0.59	

**p<.001

For blue-collar anglophones, anger was also rated significantly more accurately than the other emotions ($P<.01$). Love and happiness were rated significantly less accurately than anger and sadness ($P<.01$).

For white-collar francophones, happiness was rated significantly more accurately than the other emotions ($P<.01$). Sadness and love were rated significantly less accurately than happiness and anger ($P<.01$).

For blue-collar francophones, sadness was rated significantly more accurately than the other emotions ($P<.01$). Happiness was rated significantly less accurately than the other emotions ($P<.01$).

In short, the speech samples of the anglophone speakers tended to be identified more accurately than those of the francophone speakers. The accuracy with which particular emotions were conveyed differed for the different language-status groups of speakers. White- and blue-collar anglophones conveyed anger, white-collar francophones happiness, and blue-collar francophones sadness, most effectively.

Intensity ratings. Anglophone speakers were rated as more aroused than were francophone speakers, as shown by the main effect for speakers ($F = 238.34$, $df = 1,123$, $P<.001$). The mean intensity rating obtained by anglophone speakers was 6.58 (s.d. = .97) compared to a mean intensity rating of 5.13 (s.d. = .99) obtained by francophone speakers.

As well, there was a tendency for certain emotions to be conveyed more intensely than others, as shown by the main effect for emotion ($F = 29.21$, $df = 3,369$, $P<.001$). However, the particular emotions which were conveyed most intensely differed for each group of speakers. The language of speaker by emotion ($F = 29.21$, $df = 3,369$, $P<.001$), status of speaker by emotion ($F = 14.71$, $df = 3,369$, $P<.001$), and language of speaker by status of speaker by emotion ($F = 14.81$, $df = 3,369$, $P<.001$) interactions were all significant.

Simple simple main effects were calculated to determine, within each language-status group of speakers, whether the overall effect for emotions was significant. It was found that for each group of speakers, the differential intensity ratings were significant (see tables 6 and 7). The descending orders of intensity of emotion for each group was as follows: white-collar anglophone - anger, happiness, love, sadness ($F = 59.14$, $df = 3,369$, $P<.001$); blue-collar anglophones - anger, happiness, sadness, and love ($F = 42.50$, $df = 3,369$, $P<.001$); white-collar francophones - happiness, anger, sadness, love ($F = 12.35$, $df = 3,369$, $P<.001$); blue-collar francophones - sadness, love, happiness, anger ($F = 15.60$, $df = 3,369$, $P<.001$).

Newman-Keuls analyses were done to determine, within each language-status group combination, which pairs of means

TABLE 6

Mean intensity scores on the four emotions* for each language-status group of speakers**

	White-Collar Anglophone		Blue-Collar Anglophone		White-Collar Francophone		Blue-Collar Francophone		Marginal	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A	7.81	1.15	7.36	1.40	5.62	1.47	5.20	1.24	6.50	0.98
H	6.30	1.45	6.50	1.52	6.07	1.44	5.70	1.46	6.14	1.03
L	6.43	1.39	5.83	1.55	5.37	1.33	5.89	1.49	5.88	1.07
S	6.18	1.41	6.25	1.73	5.45	1.46	6.09	1.61	5.99	1.21
Marginal	6.68	0.98	6.49	1.13	5.63	1.09	5.72	1.12	6.13	0.91

*A = anger, H = happiness, L = love, S = sadness

**Maximum score per cell = 10.

were significantly different. For the white-collar anglophone speech samples, anger was rated as significantly more intense than all of the other emotions ($P<.01$). However, none of the other differences was significant.

Within the blue-collar anglophone speech samples, anger was rated as significantly more intense than the other emotions ($P<.01$). Happiness was rated as significantly more intense than love ($P<.01$).

Of the intensity ratings on the white-collar francophone speech samples, happiness was rated as significantly more intense than all of the other emotions ($P<.01$). None of the other differences was significant.

TABLE 7

A comparison of intensity scores on the four emotions within each language-status group of speakers

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F
White-collar anglophones	438.96	3	146.32	59.1**
Blue-collar anglophones	315.45	3	105.15	45.2**
White-collar francophones	91.70	3	30.57	12.4**
Blue-collar francophone Total	115.80	3	38.60	15.6**
Error (pooled)		369	2.47	

**p<.001

Within the blue-collar francophone speech samples, anger was rated as significantly less intense than the other emotions (P<.01).

It is interesting to note that for each language-status group of speakers, the emotion that was expressed most intensely was the most accurately identified.

In short, the samples of the anglophone speakers were rated as more intense than those of the francophone speakers. The different language-status groups of speakers dif-

fered in the intensity with which particular emotions were expressed. For each, however, the most intense was also the most accurately identified.

Analysis of errors in identification

Errors along the valence dimension.

Previous studies have investigated the kinds of errors made in identifying emotions along two different dimensions, valence and activity (eg., Apple & Hecht, 1982; McCluskey, Notes 6 & 7). The activity dimension refers to the manner in which the emotions are typically expressed, lively and varied in tone or more passive and subdued. This will be discussed in the next section.

Investigations of the valence dimension are concerned with the differential accuracy with which the positive-valence emotions, happiness and love, and the negative-valence ones, sadness and anger, are identified.

Many studies have shown that there is a tendency for negative-valence emotions to be identified more accurately than positive-valence ones (Dimitrovsky, 1964; Fenster, 1967; McCluskey, Notes 6 & 7). This was also found in the present study, where the most accurately identified emotion of three of the four groups of speakers (the exception was the white-collar francophone group) were negative-valence

ones, and the least accurately identified emotions of all four groups were positive- valence ones.

Children tend to exhibit a response bias toward the negative-valence emotions (Dimitrovsky, 1964; McCluskey, Notes 6 & 7). That is, they are more likely to label any emotion as sadness or anger than happiness or love. This response bias is not typically found with adult subjects (Davitz, 1964; Dimitrovsky, 1964; McCluskey, Note 6), although McCluskey (Note 7) did find such a bias in his adult group.

In the present study, rather than investigating response bias, that is, the tendency to emit more negative- than positive-valence responses regardless of whether they are correct or incorrect, it was decided that a more meaningful comparison would be between positive- and negative-valence errors. That is, when negative-valence emotions are correctly identified, it could be due to factors other than a greater sensitivity to negative-valence stimuli. Therefore, correct responses were not included in this analysis. If, however, an emotion was misidentified as anger or sadness, it was counted as a negative-valence error. If it was misidentified as happiness or love, it was counted as a positive-valence error. Because the identified/nonidentified factor had not been found to be significant and was not of interest in the error analyses, it was disregarded. Instead, the identified and nonidentified versions of a par-

ticular sample were both considered instances of the same valence of stimulus. The unit of analysis was each raters' score per cell. The maximum score per rater per cell was 8 (2 speakers times the identified and nonidentified versions of 2 emotions). The data were then analyzed in a 2 x 2 x 2 x 2 x 2 x 2 (language of rater by status of rater by language of speaker by status of speaker by valence of speech sample by valence of error) repeated measures analysis of variance. The complete results are displayed in Appendix G.

Overall, more negative-valence errors were made than positive ones ($F = 99.34$, $df = 1,149$, $P < .001$). In other words, if an emotion was misidentified, it was more likely to have been incorrectly labelled as sadness or anger than as love or happiness. An examination of the interaction of valence of error by language of speaker ($F = 284.94$, $df = 1,149$, $P < .001$) shows that this is largely due to English speakers eliciting more negative-valence errors than positive ones ($F = 23.09$, $df = 1,149$, $P < .01$). The effect for French speakers was in the opposite direction (more positive-valence errors), but not significant ($F = 1.2$, $df = 1,149$, $P \leq .28$). These results are shown in Tables 8 and 9.

The interaction between class of speaker and valence of error was also significant ($F = 17.56$, $df = 1,149$, $P < .001$), with blue-collar speakers eliciting significantly more negative-valence errors than positive ones ($F = 7.67$, $df = 1,149$, $P < .01$), as summarized in Tables 10 and 11.

TABLE 8

The mean number of positive- and negative-valence errors elicited by anglophone and francophone speakers*

Valence of Error	Anglophone Mean	Anglophone S.D.	Francophone Mean	Francophone S.D.	Marginal Mean	Marginal S.D.
Positive	1.21	.71	2.75	.78	1.98	.58
Negative	3.00	.65	2.43	.69	2.72	.49
Marginal	2.11	.41	2.59	.37	2.35	.28

*Maximum score per cell = 8.

TABLE 9

A comparison of the number of positive- and negative-valence errors at each level of language of speaker

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F
Anglophone	61.23	1	61.23	23.09**
Francophone	3.18	1	3.18	1.20
Error (pooled)		149	2.66	

**P < .001

In short, speech samples that were misidentified were more likely to be labelled as anger or sadness than happiness or love. Both English speakers and blue-collar speakers elicited more negative- than positive-valence errors.

TABLE 10

The mean number of positive- and negative valence errors elicited by white- and blue-collar speakers*

	White-Collar		Blue-Collar		Total	
Valence of Error	Mean	S.D.	Mean	S.D.	Mean	S.D.
Positive	2.16	.72	1.80	.69	1.98	.58
Negative	2.58	.73	2.86	.65	2.72	.49
Total	2.37	.36	2.33	.37	2.35	.28

*Maximum score per cell = 8.

TABLE 11

A comparison of the number of positive- and negative-valence errors at each level of status of speaker

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F
Blue collar	21.05	1	21.05	7.67*
White collar	3.40	1	3.40	1.24
Error (pooled)		149	2.74	

*P < .01

Errors along the activity dimension.

In previous research using filtered samples (McCluskey, Note 7; Scherer, 1972), it has been noted that filtering tends to reduce the accuracy of identification of some emotions more than others. The decrease in accuracy of the active emotions, anger and happiness (so called because they

are usually conveyed in a lively, active manner) has been found to be much greater than that of the passive emotions, sadness and love (typically conveyed in a more passive, less forceful manner). This has been attributed to the fact that the higher frequency sounds which are filtered out tend to contain more of the active cues, and removing them causes the active stimuli to sound more passive. This tends to elicit more responses of love and sadness overall than in the nonfiltered condition.

Once again it was decided to investigate errors in responding, rather than response bias, for the same reason as in the previous analysis. If a speech sample was misidentified as either love or sadness, it was counted as a passive error. If a sample was misidentified as happiness or anger, it was considered an active error. The data were analyzed in a 2 x 2 x 2 x 2 x 2 x 2 (language of rater by status of rater by language of speaker by status of speaker by active or passive speech sample by active or passive error) repeated measures analysis of variance. As in the analysis of errors on the valence dimension, the maximum score per rater per cell was eight. The complete results are displayed in Appendix H.

Because more passive than active responses are usually elicited by filtered speech, it was expected that more passive than active errors would be made. That is, samples

would be more likely to be misidentified as either love or sadness than happiness or anger because of the filtering. Although the main effect for error type was significant ($F = 9.05$, $df = 1,149$, $P<.01$), fewer passive than active errors were made. The mean number of passive errors was 2.22 (s.d. = .50) and the mean number of active errors was 2.48 (s.d. = .65).

The interaction between language and status of speaker and type of error was significant ($F = 227.76$, $df = 1, 149$, $P<.001$). Simple-simple main effects showed that among the francophone speech samples, white-collar speakers elicited significantly more active than passive errors ($F = 41.378$, $df = 1, 149$, $P<.001$) and blue-collar speakers elicited significantly more passive than active errors ($F = 44.076$, $df = 1, 149$, $P<.001$). The differences in active and passive errors elicited by white- and blue-collar anglophones did not reach significance. These results are summarized in Tables 12 and 13.

It was also found that among blue-collar speakers, anglophones received more active ratings ($F = 11.11$, $df = 1,149$, $P<.001$) and fewer passive ratings ($F = 81.9769$, $df = 1,149$, $P<.001$) than francophones. For white-collar speakers these differences were reversed, with francophones receiving more active error ratings ($F = 27.438$, $df = 1,149$, $P<.001$), and fewer passive ratings than anglophones. However, the

TABLE 12

Mean number of active and passive errors elicited by the different language-status groups of speakers*

	Error Type					
	Active		Passive		Marginal	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Anglophone						
White-collar	2.42	1.08	1.94	0.78	2.18	0.55
Blue-Collar	2.35	0.98	1.69	0.85	2.03	0.52
Speakers						
Francophone						
White-collar	3.46	1.12	1.69	0.93	2.57	0.51
Blue-collar	1.68	0.92	3.60	0.94	2.64	0.47
Marginal	2.48	0.65	2.23	0.50	2.36	0.28

*Maximum score per cell = 8.

TABLE 13

A comparison of the number of active and passive errors elicited within each language-status group of speakers

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F
White-collar francophone	128.56	1	128.56	41.37**
Blue-collar francophone	136.95	1	136.95	44.08**
White-collar anglophone	8.59	1	8.59	2.76
Blue-collar francophone	15.22	1	15.22	4.90
Error (pooled)		149	3.11	

**p<.001

difference in passive rating errors was not significant ($F = 1.98$, $df = 1, 149$, $P \leq .17$). The results are summarized in Tables 12 and 14.

TABLE 14

A comparison of anglophone and francophone speakers at each status level for each error type

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F
White collar, active errors	43.95	1	43.95	27.44**
White collar, passive errors	3.16	1	3.16	1.98
Blue collar, active errors	17.80	1	17.80	11.11**
Blue collar, passive errors	131.33	1	131.33	81.98**
Error (pooled)		149	1.60	

**p<.001

In short, when speech samples were misidentified, they were more likely to be misidentified as one of the active, rather than one of the passive, emotions. This is the opposite of what was expected because of the filtering, which typically makes speech samples sound more passive. White-collar francophone speakers elicited more active errors than blue-collar francophones or white-collar anglophones.

Blue-collar anglophones elicited more active errors and fewer passive errors than blue-collar francophones.

Discussion

Cross-cultural considerations

Hypothesis 1, that subjects would identify emotions more accurately in their first language than across languages, was not supported. Although some studies comparing different language groups have found main effects for speakers or raters on accuracy (Kretch, Note 8; McCluskey et al., 1975, McCluskey and Albas, 1978), an interaction rather than main effects was predicted in this study. Both groups of raters were expected to be reasonably accurate overall, with each having a slight edge on samples by speakers of the same language group. It was felt that there was no a priori basis for predicting encoder or decoder effects in accuracy and, in fact, the effect for language of rater was not significant. However, instead of each group of raters being more accurate on same-language samples, both anglophones and francophones rated English samples more accurately. It would have been less surprising if, instead of the hypothesized interaction, French samples had been found to be identified more accurately. This would have appeared to be more consistent with the findings that Mexicans were superior to English-Canadians in both the encoding and decoding of

vocal emotion (McCluskey et al., 1975; McCluskey & Albas, 1978), which the authors attributed to a more emotionally-exressive Mexican style of communication, since francophones have been found to be more expressive than anglophones in other nonverbal channels (LaCroix & Rioux, 1978). Such thinking represents an implicitly-held redundancy theory of communication of emotion, the belief that the same information is conveyed simultaneusly in various channels.

Redundancy and nonredundancy theories of the communication of emotion are attempts to explain how an individual's affective behaviours are distributed among the various channels. According to the redundancy theory, unless a person purposely tries to dampen the expression in a given channel, one would expect the level of affective information in each channel to covary positively. That is, a sad person would be expected to look and sound sad, as well as to choose sad words (Izard, 1971). According to nonredundancy theories, affective behaviour is not distributed uniformly across expressive channels. A particular channel may be favoured because of individual preferences (Berman, Shulman, and Marwit (1976) or expression in a given channel may be dampened due to cultural display rules (Ekman & Friesen, 1969).

A recent study provided strong evidence for a nonreduncy theory of emotional expression. Apple and Hecht (1982) had speakers convey emotions by reading standard sentences ei-

ther verbally neutral (e.g., "It makes me sweat when I run to class") or verbally appropriate to the emotion expressed (e.g., "It makes me mad when you talk like that"). All samples were filtered so that the verbal content could not be understood by the raters. It was found that all of the emotions but sadness were identified more accurately in the verbally-neutral than in the verbally-appropriate condition, suggesting that speakers tended to compensate for the neutral words by making them more expressive in tone. Multidimensional scaling revealed that for all four emotions, the neutral-content versions were perceived as having greater energy than those with emotionally appropriate content.

The above study suggests that the amount of information in the vocal channel varies inversely with the amount of information in the verbal channel. Berman et al. (1976) found individual stylistic differences in the channels used to convey the impression of warmth or coldness. To portray the different personality styles, some actors relied more on variations in the vocal and others on variations in the facial channel. Unlike the Apple and Hecht (1982) study, which suggested that the amount of information in the vocal channel depended on the amount of information in the verbal channel, this study suggested there may be individual stylistic preferences governing the choice of channel used to carry emotional or personality information.

In light of these studies, it is interesting to reconsider the finding that the English samples were more accurately identified than the French. Perhaps, in addition to individual differences in channel preference, as demonstrated by Berman et al. (1976), there are also cross-cultural differences. It is possible that anglophones tend to favour the vocal over the gestural channel, while for francophones the reverse may be true. This would not be inconsistent with the findings of Apple and Hecht (1982). Although individuals are capable of varying the amount of emotion conveyed by a particular channel, it is quite conceivable that cultural preferences in channel usage are learned. The finding of LaCroix and Rioux (1978) that francophones were perceived to be more excitable, open, and active on the gestural but not on the verbal level than anglophones supports the idea that this may be a preferred channel for francophones. If the nonredundancy theory can be generalized beyond a few experimental settings, it can perhaps account for francophones' lesser expressivity in the vocal channel. The fact that anglophone speakers were not found to be more expressive in the vocal channel than their francophone counterparts in the study by LaCroix and Rioux would appear to weaken this argument. However, the communicators in that study read passages, and, according to Romaine (1980), the range of variation in speech is narrower in reading than in speaking.

In short, it is possible that the English samples were more accurately identified than the French ones because anglophones tend to rely more heavily on the vocal channel than do francophones. If this were the case, one might also expect to find that anglophones were superior to francophones at decoding vocal emotion, and this was not found. As noted earlier, the effect for language of rater was not significant. However, other studies have found that the most accurate encoders are not necessarily the most accurate decoders of vocal emotion. For example, Kretsch (Note 8), using American, Japanese, and Israeli speakers, found Israelis to be the most accurate encoders and Americans the most accurate decoders of vocal emotion. Therefore, anglophones may tend to emphasize the vocal channel in the expression of emotion more than francophones even though they do not demonstrate more skill at decoding in that channel.

Another avenue of explanation to consider is the correspondence between the accuracy of emotion scores and the intensity ratings. The English samples were not only rated more accurately, they were also rated as more intense than the French samples. Also, for each language-status group of speakers, the emotion that was conveyed the most intensely was the most accurately identified. This makes sense on an intuitive level - the 'more' there is of an emotion, the more recognizable it is.

A search of the literature revealed no other studies investigating accuracy and intensity. However, in the previously-mentioned study by Apple and Hecht (1982), the energy dimension revealed by multidimensional scaling was somewhat similar to the concept of intensity. By analyzing the pattern of errors of identification, Apple and Hecht uncovered two basic dimensions underlying vocally-expressed emotion; pleasant-unpleasant and energy level, the same dimensions found by Green and Cliff (1975) using a somewhat different experimental design. Apple and Hecht also had other subjects rate each speech sample on the two dimensions to confirm the results of the multidimensional scaling. They found that the different vocal expressions of affect were located in a V-shape in the multidimensional space, with happiness and surprise at one wing of the V (high energy, pleasant), sadness at the vertex (low energy, unpleasant), and anger at the other wing (high energy, unpleasant). The ratings for neutral verbal content stimuli and emotionally-appropriate verbal content stimuli were distributed on two different V's, with the neutral content V higher on the energy dimemsion than the other. As noted earlier, with the exception of sadness, an emotion was identified more accurately in the neutral verbal content condition than in the appropriate content condition. The authors explained this in terms of the fact that sadness is a low-energy emotion and the extra energy speakers give to it in the neutral con-

tent condition of the experiment makes it less recognizable. By contrast, the extra energy given to the other emotions makes them more recognizable.

While it may appear that the intensity rating in the present study was actually measuring energy level, a higher intensity rating on sadness for blue-collar francophone speakers corresponded to a higher accuracy rating. Raters in this study were instructed to rate the extent to which a speaker was feeling each emotion. Therefore, high intensity and high accuracy ratings for sadness went hand in hand because 'more' sadness meant less energy and therefore higher rates of recognition.

The Apple and Hecht (1982) study has been described at length because of the similarity of the finding that with most emotions, the more energetically (intensely) they are conveyed, the more accurately they are identified. This offers some support for the idea that the correspondance in the present study between accuracy and intensity was not coincidental. However, the question remains: did anglophones convey emotions more intensely than francophones because this is typical of how they express emotion vocally (perhaps because it is their preferred channel as opposed to the gestural channel for francophones) or was it an artifact of the experiment?

With the exception of a study by Green and Cliff (1975) which pinpointed specific situations for the speaker to imagine while conveying emotion, researchers in the area of the vocal communication of emotion have typically asked speakers to imagine situations in which they felt extremely happy, sad, etc., and then attempt to convey that emotion in a particular way (e.g. McCluskey et al., 1975). In the present study no attempt was made to have speakers imagine a standardized situation for each emotion, nor were speakers asked to convey emotions as expressively as possible. In fact, the experimenter was careful not to give any hints as to how intensely an emotion should be expressed, since possible differences in intensity were to be investigated in the study. While in retrospect it might have been better to control for the intensity of the stimulus situations, it is unlikely, though not impossible, that a systematic bias in the type of situation imagined could have occurred.

There are other factors to consider which might have affected the relative intensity of the speech samples. The samples of both the anglophone and francophone speakers were obtained by the English-speaking experimenter, with all of the instructions and explanations given in English. It is possible that the francophones felt more uncomfortable or self-conscious than the anglophones, and that might have inhibited the degree of their expressivity. However, this did not appear to be the case. Comfort with the situation ap-

peared to follow social status lines rather than language lines or acquaintance with the experimenter. That is, the anglophone and francophone white-collar speakers appeared equally relaxed and seemed to enjoy the challenge of acting out the emotions, even though the anglophone speakers were friends of the experimenter and the francophones were unknown to her prior to the study. As three out of four were university professors, they may have been quite accustomed to requests of this sort. On the other hand, the blue-collar speakers were initially a lot less comfortable with the idea of acting out the speech samples. Greater efforts were required to put them at ease and persuade them to try. Therefore, if comfort with the situation could be thought to account for the higher intensity ratings of the anglophone speakers, it should have worked in the same way to create higher intensity scores for white-collar than blue-collar speakers, and this was not found. The main effect for status of speaker was not significant.

Another possible explanation of the higher intensity scores received by anglophone speakers is somewhat related to the above explanation. The anglophone speakers were unilingual and the francophones bilingual. Of the blue-collar francophones, one spoke entirely and the other almost entirely in English at work. It is possible that they had become less accustomed to speaking French and this might have have modified their expressivity. However, the white-collar

francophones, both French professors, spoke French during the course of their work, and at least one was known to be active in French broadcasting in the community. Although the class of speaker by language of speaker interaction was significant ($F = 6.18$, $df = 1,123$, $P < .01$), the difference between the intensity ratings of white- and blue-collar francophones was not significant ($F = 0.00$, $df = 1,123$, $P < 1.00$). Therefore, it would appear that the degree of usage of their first language did not affect francophones' intensity scores.

Evidence which could weaken the idea that the higher intensity ratings of anglophone speakers was due to the vocal channel being their preferred channel of expression becomes apparent in considering the nonsupport of hypothesis 4. Hypothesis 4 stated that for any given stimulus, francophones would perceive emotional arousal to be lower than would anglophones. This hypothesis was also based on an implicitly-held redundancy theory of the communication of emotion. Because francophones were found to be more expressive in the gestural channel (LaCroix & Rioux, 1978), it was expected that they would also be accustomed to more varied and dramatic vocal expressions and not consider them signs of high arousal. As discussed earlier, recent studies appear to support a nonredundancy theory of emotion, that is, an inverse correlation between levels of expression in the various channels (Apple & Hecht, 1982; Berman et al., 1976).

Further, if it were the case that francophone speakers relied less on the vocal than on the gestural channel for the communication of emotion, one might then have expected to find the opposite to what was predicted: a tendency for francophones to rate intensity higher than anglophones, who would be the ones more used to varied vocal communication. This was not found either. The language of rater effect was not significant, a fact which has two possible implications. One is that it could lend support to the idea that the greater intensity with which anglophone speakers emoted may have been an artifact of the experiment and not necessarily due to their tendancy to be more expressive in the vocal channel. The other is that greater or lesser expressivity in a channel may not necessarily be accompanied by a corresponding lesser or greater perception of arousal in that channel. In the study by LaCroix & Rioux (1978) both anglophone and francophone raters found francophones to be more expressive than anglophones on the gestural level, but there was no effect for culture of rater on ratings of expressivity. Therefore, while if francophones in the present study had been found to rate arousal higher than anglophones it would have strengthened the argument that anglophones are more expressive in the vocal channel, the fact that this did not occur does not rule out the possibility that anglophones' greater intensity is a 'true' finding.

In short, the greater accuracy with which the anglophone samples were identified might have been due to the higher intensity with which they were communicated. This, in turn, might have been due to a cultural preference on the part of English-Canadians toward greater expressivity in the vocal channel.

Future research could attempt to determine whether anglophones do rely more on the vocal channel and, therefore, invest it with more intensity, while francophones rely more on the gestural channel in the communication of emotion. This could be investigated using multidimensional scaling in a design similar to that of Berman et al. (1976). A large enough sample of anglophone and francophone speakers would have to be used to avoid confounding cross-cultural with individual differences in channel preferences. By using a number of dimensions instead of accuracy scores, a more subtle measure of the variations in a given channel could be made. Judges would rate either audio or video recordings of speakers reciting neutral-content sentences in either a neutral manner or in the portrayal of a particular emotion. If anglophones or francophones have preferred channels of emotional expression, one would expect greater changes along more dimensions in the preferred channel than in the nonpreferred channel when comparing ratings on neutrally and emotionally conveyed samples.

There is one further avenue of explanation to explore to account for the above findings, a structural analysis of the position of anglophones and francophones in Canadian society. This will be considered after a brief discussion of the final hypothesis concerned with language differences.

The identified/nonidentified factor

It was not surprising that hypothesis 3, that subjects would identify emotions more accurately when the language spoken was identified, was not supported, given that hypothesis 1, that each group would be more accurate on same-language than other-language samples, was not. It was believed that after even a little exposure to the other language, accuracy would increase when raters knew they were rating samples in the other language (that is, they would be able to judge according to different standards if they knew they had to). However, hypothesis 1 was not borne out, as accuracy appeared to be linked more to intensity of expression than to cultural similarity or differences.

A multiple-level explanatory model

As indicated earlier, there is another avenue of explanation of the findings which can provide a more coherent framework for them, as well as a more comprehensive basis for integrating them with the findings of other cross-cul-

tural studies of nonverbal communication. This explanation draws upon physiological, cultural and linguistic, and structural levels of analysis*.

LaFrance and Mayo (1978), in their review of the literature on nonverbal communication, argue that the polarized dispute over the cross-cultural similarity or diversity of nonverbal communication is meaningless. They stress the fact that there is an innate, universal core to the expression of basic emotions. (They consider emotions such as anger, happiness, and sadness to be basic or pure emotions and to be found in all cultures, as opposed to complex emotions, such as smugness or pride, which may not be universally experienced). Just as neural impulses to the facial muscles result in facial expressions that are recognized almost universally (Ekman et al., 1972), so voice production is affected in predictable ways by such factors as respiration rate and muscle tension. Eady (1982) outlined language-specific and universal factors affecting pitch and intonation. He quoted Chao's (1968) comparison of the relationship of Chinese syllable tone to sentence intonation with "small ripples on large waves (though occasionally the ripples may be larger than the waves)" (p.39). This comparsion would also seem apt to describe the relative effects of culture and physiology on the vocal expression of emotion. In peri-

* I am grateful to Dr. D. Albas of the Department of Sociology, University of Manitoba, for suggesting this approach to the findings.

ods of relative calm, the ripples (of cultural differences) are probably pre-eminent. However, during stormy weather, the swell of the waves (physiological changes) would vastly overshadow the ripples. Then, unless the ripples were very great, they would not be noticed at all.

The physiological basis of emotional expression accounts for the fact that in virtually every cross-cultural study, vocally-expressed emotions are recognized with an accuracy that is greater than chance (LaFrance & Mayo, 1978).* However, the level of accuracy increases with increased cultural similarity between encoder and decoder (Rosenthal et al., 1979).

The fact that anglophone and francophone Canadians were not more accurate identifying emotion in their own language than across languages, and the fact that emotions were not identified more accurately when the language of the speaker

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* The somewhat lower accuracy of identification in the present study, as compared to others employing a similar methodology (e.g., McCluskey, Notes 6 & 7) might be due to the fact that the raters participated in groups in a classroom setting, rather than individually in a more intimate setting. Aside from the fact that subjects may work harder for an experimenter with whom they are face-to-face, rather than as an anonymous member of a group, dyadic interaction may be closer to real-life situations in which indivduals are more attuned to emotional nuances. The classroom setting, in particular, with its emphasis on the rational, may minimize a rater's sensitivity to emotion. The study by Apple and Hecht (1982) was also run in groups and the accuracy of identification of emotions, although above chance level for all but one of their eight samples, was also somewhat lower than in studies in which subjects were run individually.

was known, suggests that with English and French, as spoken in Canada, the physiological factors affecting vocal expression of emotion far outweigh any cultural or linguistic differences, or indeed, the cultural and linguistic differences may not be very great to start with.* Studies which reported cross-cultural differences in ratings of vocal emotion compared cultures and languages which would appear to be more dissimilar than those compared in the present study. Not only do the Polish, Japanese, and American cultures (Beier & Zautra,1972) and anglophone Canadian and Cree (Albas et al., 1976) or Mexican cultures (McCluskey et al., 1975; McCluskey & Albas, 1978) appear further apart than anglophone and francophone Canadian cultures, but the languages spoken are more dissimilar than French and English. Cree, Japanese, and English are from different language families (Bloomfield, 1965). Polish and English are from separate branches of the Indo-European family. The east - west branching from which they developed is believed to have taken place very early and the languages have had virtually no historical influence on each other (Lehmann, 1962). Although Spanish and French are closely related and are in the same major branch of the Indo-European family as English, Spanish and English have had much less effect on one another than have French

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* Linguistic features, such as the phonemic structure of a language, are those which give cognitive meaning to an utterance. In the discussion that follows, it is impossible to separate the effects of cultural and linguistic differences on the perception of vocal emotion.

and English. In terms of culture, anglophone and francophone Canadians are exposed to many of the same influences, including the great cultural leveller, American television programming.

Therefore, the fact that the hypotheses concerning language in the present study were not supported, even though differences between anglophones and francophones in other nonverbal modalities have been reported, suggests that the physiological component may be much greater in vocal expression than in other nonverbal modalities. It probably plays a much smaller role in gestural expression and a negligible one in proximics, or interpersonal spacing preferences, another area of nonverbal communication in which anglophones and francophones have been found to differ (Albas & Albas, Note 4). Further, it suggests that the cultural and linguistic differences between anglophone and francophone Canadians are not so great as to impede understanding of vocally-conveyed emotion. At a time when language rights is an exceedingly bitter political issue in Canada (Report of the Commission of Official Languages, 1982), it may be comforting to know that there is at least one less obstacle to inter-group communication than might have been suspected.

How, then, can the greater accuracy and intensity ratings of anglophone speakers by both anglophone and francophone raters be understood? The only explanation that would

appear to account for this is a structural one; that is, an analysis of the relative positions of anglophones and francophones in Canadian society.

According to the 1981 annual report of the Commision of Offical Languages, English is still the dominant language of the civil service. Francophones are more likely to speak English during the course of their work (41% of the time) than anglophones are to speak French (10% of the time). As well, anglophones tend to be overrepresented in the scientific, technical, and executive levels of government, while francophones are overrepresented in the cultural-educational sector and in lower-ranking administration or direct-service positions. The francophone presence is particularly lacking in the high-ranking positions of the ministries wielding the most political power, such as the ministries of finance and social and economical development. If the relative positions of anglophones and francophones in the civil service has changed so little since the Report of the Royal Commision on Bilingualism and Biculturism in 1968, despite years of government support for the notion of equality of linguistic opportunity, affirmative action hiring practices, and vast amounts of money devoted to second-language learning, how much less likely is the probabilty of change in the status of francophone and anglophone Canadians in the private sector?

The greater social and economic power of anglophones may well account for the fact that their speech was more accurately identified and rated as more intense by raters of both language groups. Generations of social and economic oppression may have resulted in a tendency for francophones to speak with less authority or intensity than do anglophones, who have enjoyed a more privileged position in Canadian society. Speculating further, the fact of their different social positions may help to explain why, with the different language-status groups of speakers, different emotions were expressed the most intensely and identified the most accurately. While this will be explored more fully in the following section, it is interesting to note that with both white- and blue-collar anglophone speakers, anger was the emotion that was expressed the most intensely and identified the most accurately. This was not the case with francophone speakers. The emotion the most accurately conveyed by white-collar francophones was happiness, while for blue-collar francophones it was sadness. With blue-collar francophones, presumably the least powerful of the four groups in this study, anger was the least intensely conveyed. It may be that the overt expression of anger is the perogative of the powerful.

In short, by utilizing the different levels of analysis (physiological, cultural and linguistic, and structural) it is possible to explain why differences have been found be-

tween French- and English-speaking Canadians in some nonverbal modalities and not others, why cross-language rater effects have been found in studies of vocal emotion between speakers of English and various other languages but not between Canadian anglophones and francophones, and why the emotions of anglophone speakers were identified more accurately and perceived as more intense than those of francophone speakers by raters of both language groups.

Order of accuracy and error considerations

While it was assumed that the order of accuracy with which emotions were identified would be different for the different language-status groups of speakers, it was expected that the order of accuracy of white-collar anglophone samples would be similar to those found in other studies using North American anglophone speakers with filtered speech samples. This was not found. The order of accuracy for the white-collar anglophones in this study was anger, sadness, happiness, and love, with anger rated significantly more accurately, and love significantly less accurately, than the other emotions.

Only three of the four emotions used by Apple and Hecht (1982) were the same as those used in the present study. The emotions they used were sadness, happiness, anger, and, instead of love, surprise. The order of accuracy they found

was sadness, surprise, anger, and happiness, with only the difference between sadness and the others being statistically significant. The authors attributed this to the fact that the vocal cues for sadness, the only 'passive' emotion that they used, differ so markedly from those of the other three 'active' emotions. As well, the pattern of errors differed in their two conditions, neutral verbal or emotionally-appropriate verbal content, both of which were filtered. For example, happiness was three times more likely to be labelled sadness in the emotionally-appropriate verbal condition (where happiness was conveyed less energetically) than in the verbally-neutral condition.

McCluskey (Note 7) found the order of accuracy of filtered samples to be sadness, anger, love, and happiness, with all but the difference between sadness and anger reaching significance. He attributed the greater accuracy on sadness to the removal of active cues in the filtered condition (in the nonfiltered condition the order of accuracy was anger, sadness, happiness, and love) and the tendency of subjects to be more accurate in the identification of negative emotions.

Comparisons of the order of accuracy of speech samples of the white-collar anglophone group with those in the two above-mentioned studies begin to show some of the complexity of factors influencing which emotion is expressed most accu-

rately. While each of the authors offered different explanations for why sadness was the most frequent correctly identified emotion, it was not found to be so in the present study. Anger was identified the most accurately and was also the most intensely expressed by white-collar anglophones. Also, although the most accurately conveyed emotion of the other groups of speakers differed, in each case it was always the most intensely conveyed. Therefore, it would appear that sadness is not invariably the most accurately expressed of filtered emotions and that intensity is a strong contender among concepts put forth to explain why some emotions are more accurately identified than others. It is certainly a factor which bears controlling in future studies of the vocal expression of emotion.

As in previous studies (Dimitrovsky, 1964; Fenster, 1967; McCluskey, Notes 6 & 7), negative-valence emotions were more accurately identified than positive-valence ones. This sensitivity to negative emotions has been considered the result of learning that the consequences of misunderstanding a negative-valence message can be more serious than those of misunderstanding a positive-valence one (Fenster, 1967). However, the differential accuracy with which the negative emotions were identified in this study may not have been the result of a response bias or differential sensitivity in general. As the error analysis shows, although more negative- than positive-valence errors were made overall,

there were also significant interactions. Thus, anglophone speakers, when misidentified, tended to elicit more negative-valence responses than positive ones. However, this was not true for francophone speakers, for whom there was no such bias. Also, blue-collar speakers tended to elicit more negative-valence errors than positive ones, but this was not true for white-collar speakers. Unfortunately, the present study provides no clues concerning what qualities in anglophone and in blue-collar speech make them sound more negative.

The results of the error analysis along the activity dimension were also unexpected. Because filtering tends to reduce the active cues, the likelihood of a stimulus being labelled as one of the passive emotions should be increased. However, in this study, when a sample was misidentified, it was more likely to be labelled as one of the active than one of the passive emotions.

The errors that were made along the activity dimension for the francophone speakers were consistent with the literature on social status markers (Brown et al., 1973, 1974, 1975; Frender et al., 1970; Smith et al., 1975). That is, the samples of white-collar speakers, whose speech was expected to be quicker in rate, elicited more active errors than passive errors, while the blue-collar speakers elicited more passive than active errors. Similarly, among white-

collar speakers, francophone speech samples received more active errors than anglophone samples did. This is also consistent with what had been hypothesized - that the speech of the francophones would sound more lively, active, and varied. However, this did not hold true among blue-collar speakers, where anglophone samples tended to elicit more active and fewer passive errors than francophone samples.

The results of the analysis of errors on the activity dimension are impossible to interpret consistently with any of the literature on social class or cross-cultural differences. However, they do highlight the fact that the filtering of speech samples does not always result in more passive than active responses.

Social status considerations

Hypotheses 2, that raters would be more accurate on samples by speakers of the same social status, and 5, that white-collar raters would perceive emotional arousal to be lower than would blue-collar raters, neither of which were confirmed, were based on the assumption that the vocal communication of emotion by speakers of different social status would be found to differ. Two lines of research were cited to support these hypotheses. One line of research reported stylistic differences in other modes of nonverbal communication (e.g., Aiello & Cooper, 1972; S.Scherer, 1974; Schmidt

& Hore, 1970). 'Stylistic differences' refers to differences in mannerisms or customs which have arbitrarily become associated with particular groups and which are perpetuated within the group, not because of some quality intrinsic to members of the group but through learning due to within- group interaction (Edwards, 1976). The other line of research reported vocal differences which may be thought to be "reflections of motivational, emotional and personality traits that are characteristic of (or even a cause of) the social or occupational levels" (Brown & Lambert, 1976, page 52). That is, the vocal characteristics are thought to be nonarbitrarily associated with social status and, unlike prestige accents, recognizable even to listeners who do not speak the language. The work by Robbins et al. (1978) is characteristic of the latter sort, which shall be referred to as 'deficit' theories of social class differences (Edwards, 1976). 'Deficit' implies that it is the lack (or conversely, the presence) of particular personal qualities which are reflected in speech which help to determine a person's social status.

Hypotheses 2 and 5 were based on the deficit model, that is, on the assumption that qualities of speech that are associated with social status are related to personality factors such as competence, the factor name given by Brown and Lambert (1976) to include such traits as intelligence, confidence, and ambitiousness, and would, therefore, be consis-

tent across different languages. If they were merely stylistic differences, there would be no reason to assume that francophone blue-collar vocal style would be similar to anglophone blue-collar vocal style. The reasoning behind hypothesis 2 was as follows. The vocal qualities of pitch, rate, and intonation which have been found to differentiate white- and blue-collar workers in neutral situations are also the vocal qualities which vary during emotional expression. Therefore, it might be expected that the vocal expression of emotion by speakers of white- and blue-collar status would also differ. Because accuracy of identification of emotion increases with increased familiarity with group norms (McCluskey, 1978) and because people tend to socialize more within than across social status levels (Argyle, 1972a), it was expected that people would be more accurate at identifying vocal emotion by speakers of the same status level than across status levels (hypothesis 2). If social status had only been varied in one language group, this hypothesis could have reflected either stylistic differences or deficit theory underpinnings. However, because the vocal expression of speakers of particular status levels were expected to be similar across different languages, the vocal characteristics were assumed to be nonarbitrarily associated with status levels. Hypothesis 5, that white-collar raters would perceive arousal to be lower than would blue-collar raters, was more clearly based on the deficit

theory. That is, because white-collar speakers have been found to sound more competent, and competence has been found to be associated with quicker rates of speech and greater range of intonation, it was assumed that they would be more accustomed to quicker, more varied speech than blue-collar workers and, therefore, less likely to perceive it as being a sign of higher arousal.

It could be contended that the criterion for designating social status of the subjects in this study did not reflect the deficit theory of social status differences. The subjects were all university students (who presumably sounded competent and were destined to become white-collar workers) and were designated as white- or blue-collar on the basis of their fathers' occupation. This would have been adequate for hypotheses based on assumptions of stylistic differences. Presumably, members of each group would have grown up exposed to a particular stylistic environment. However, the social status of the <u>speakers</u> in this study was based on their own occupations. Therefore, even considering the raters to have all really been white-collar by deficit theory criteria, hypothesis 2 could have still been supported by a status of speaker effect, with the white-collar speakers of each language group being rated more accurately. This was not found. Therefore, it would appear that either the vocal differences that accompany social status differences in neutral situations are not retained in the communication of

emotion (that is, changes due to emotion obliterate those due to social status), or that the differences do exist but do not affect the identifiability of the emotion. It may be, as hypothesis 5 states, that differences due to social status level are reflected in differences in perceived intensity rather than in accuracy scores. However, by deficit theory standards, all of the subjects of this study would have been classified as white-collar, and hypothesis 5 would not be testable.

Although, as discussed above, hypothesis 5 was not really testable due to the way the social status of subjects was designated, the ideas behind it could still be tested by examining the main effect for status of speaker. That is, lower arousal ratings were predicted for white-collar raters because it was assumed they were used to hearing the livelier, more active speech of other white-collar workers. Therefore, by the same reasoning, white-collar speakers could be expected to receive higher intensity ratings than blue-collar speakers and this was not found. However, this is a weaker test of the ideas behind hypothesis 5 because of the small number of speakers used, the fact that they were not randomly chosen, and because no attempt was made to control for the kind of stimulus situation imagined, which might have affected the intensity with which the emotions were conveyed.

The most telling argument against the deficit theory of status differences in the vocal communication of emotion comes from the analysis of errors on the activity dimension. If the factors associated with competence (in particular, a quicker rate of speech) are also associated with social class, and if these differences affected the vocal communication of emotion, it is likely that the speech of white-collar speakers would have been perceived as more active than that of blue-collar workers. This would have shown up by the speech samples of white-collar workers eliciting more active errors than the samples of blue-collar workers. This was only found for the francophone speakers.

It would appear, therefore, that vocal differences between speakers of white- and blue-collar status are masked or overridden by the vocal changes that accompany the communication of emotion, such that there is no loss in accuracy when identifying filtered expressions of emotion across rather than within social status levels*. It would appear, too, that there are no perceived intensity differences in

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* It might be interesting to test whether the vocal communication of emotion does indeed mask vocal cues to social status by having two sets of judges estimate the status of various speakers; one group of judges hearing them speaking standard passages in a neutral manner, the other group hearing the same speakers using the same sentences to convey different emotions. If the first group of judges can estimate social status more accurately than the second, there would be more support for the idea that vocal changes accompanying emotional expression override or mask the vocal qualities associated with the different social status levels.

speakers of different social status, although the evidence for this is less direct.

Again, these findings can be understood in terms of the physiological and cultural bases of nonverbal communication. The physiological basis of vocally-expressed emotion is apparently much greater than the vocal factors which differentiate speakers of different social status in neutral situations. Also, these findings highlight the positive fact that members of the different status groups perceive vocal emotion in a very similar manner. This may reflect the fact that Canada has a relatively fluid class system, with frequent opportunities for interaction between people of different status and similar cultural influences across status levels. In particular, the levelling influence of television cannot be underestimated.

Methodological limitations of the present study

All of the findings reported in this study are based on speaker, not rater, differences and it must be remembered that there were only two speakers in each language-status group. Although care was taken to ensure that they sounded natural to other speakers of the same language-status group, and sounded representative of their social status, they were not randomly chosen. Thus, the results reported may have been affected by a sampling bias. The particular anglophone

speakers chosen may have been more out-going or intense individuals than the francophone speakers, but this may not be typical of anglophones and francophones as a whole.

As mentioned earlier, no attempt was made to equate the kinds of situations the speakers imagined before emoting. Therefore, differences in perceived intensity could have resulted from the different kinds of scenerios imagined. Because it appears that the intensity with which an emotion is communicated may affect the accuracy with which it is received, it would be important to control this in future studies.

The speech samples in this study were very short in duration and research has shown that accuracy increases with increased duration of stimulus (Beier & Zautra, 1972). As well, the samples were filtered, which has also been shown to affect the accuracy with which they are identified (McCluskey, Note 7; Scherer, Koivumaki, & Rosenthal, 1972). Therefore, the differences in accuracy which were reported in this study might not have occurred in a more naturalistic setting. As Edwards (1976) cautions, "The researcher should surely retain an acute sense of humility as he contemplates that fragment of a person's speech that constitutes his data" (page 122). The results should be interpreted with these caveats in mind.

The limitations outlined above would have served to highlight rather than minimize any real-life communication difficulties between anglophone and francophone Canadians of white- and blue-collar status. It is probably safe to say that, on the vocal level at least, inter-group perception of emotion between members of these groups is very accurate, indeed.

Summary and conclusions

The fact that none of the hypothesized differences was supported suggests that, for anglophone and francophone Canadians of white- and blue-collar status, the perception of vocal emotion is not a hindrance to intergroup communication. It would appear that the physiological component underlying the vocal channel of emotional expression is greater than for other nonverbal channels. Therefore, cross-group rating differences probably only occur between languages and cultures that are much more dissimilar than those compared in the present study.

The fact that English speech samples were rated more accurately and as more intense than the French samples, and that with each of the language-status groups of speakers, the emotion the most accurately conveyed was also rated as the most intense, suggests that previous explanations of why one emotion is identified more accurately than another may

not be correct. The intensity with which an emotion is conveyed might be the most important factor in how accurately it is received.

Two explanations may account for the greater accuracy and intensity ratings of the English samples. The vocal channel might be a preferred channel of expression for anglophones, like the gestural channel has been shown to be for francophones. On the other hand, anglophones might speak with more authority or intensity because of their more privileged position in Canadian society.

Appendix A

Review of the Literature

A person communicates by much more than the words he speaks. Studies have shown that gaze (Goffman, 1963; La-France & Mayo, 1976; Erikson, Note 9), facial expressions (Ekman, 1972; Ekman & Friesen, 1969; Izard, 1969) gestures (Brault, 1962; Ekman, 1976), proximity (Hall, 1974; Watson & Graves, 1966) physical orientation (Brockman & Muller, 1973; Sommer, 1959), general physical appearance (Argyle, 1972b) and speech qualities (see following sections) communicate a great deal of information about us. Some of these nonverbal factors are unconscious (von Raffler- Engel, Note 10); others, such as perspiration and tics, are involuntary; and still others are more or less voluntary. Certainly outer appearance can be manipulated to a great extent and several authors are currently specializing in advising how to dress to convey particular impressions in specific contexts (e.g., Molloy, 1978).

Argyle (1972a) and LaFrance and Mayo (1978) outlined the different functions of nonverbal communication:

1. Replacing speech; for example, nodding one's head in assent.

2. Supporting the verbal communication; completing or amplifying the meaning of an utterance.
3. Regulating the flow of conversation; for example, signaling when one party to a conversation has finished speaking.
4. Communicating interpersonal attitudes and emotions.

It is this latter function of nonverbal communication with which the present research is concerned.

Some nonverbal behaviours are understood across a wide variety of cultures, while others are culture-specific (Argyle, 1972a; Bouchard & Carlson, 1980; Eibl-Eibesfeldt, 1972; Ekman, 1972). Sometimes the same nonverbal behaviour can communicate different things within a culture (e.g., tears of grief or tears of joy). Although the nonverbal expression of some emotions is similar across cultures (Ekman, 1972; Ekman & Friesen, 1975; Ekman, Friesen & Ellsworth, 1972), there are culturally-based rules for the display of emotion which control which, and how much, of an emotion one can exhibit in a particular situation (Ekman, Friesen & Ellsworth, 1972). Therefore, for groups to whom a 'stiff upper lip' is always appropriate, more open displays of feeling by members of cultures with less restrictive display rules may appear excessive (LaFrance & Mayo, 1978; Loveday, 1981).

Many aspects of speech modify or enhance the literal content of what is communicated. The degree of formality (Fishman, 1972; Gumperz, 1970), dialect (Bishop, 1976; Bourhis, Giles & Lambert, 1975) and the language which a multilingual speaker chooses to use (Blom & Gumperz, 1972; Fishman, 1971, 1972; Herman, 1978; Sandilands & Fleury, 1979; Segalowitz, 1976, 1977; Simard, Taylor & Giles, 1976) all have an effect on communication. Certainly, when Charles, Prince of Wales, addresses Welsh students in their native language, he is attempting to communicate something beyond the literal meaning of his words. Like other nonverbal behaviour, some aspects of speech can be manipulated at will (e.g., degree of formality), while others, such as those which convey social status information (Brown & Lambert, 1976; Brown, Note 2) are much more subtle.

Linguists have found certain intonation patterns to be almost universal (Bolinger, 1972; Lieberman, 1967). While they frequently have the same meaning across cultures (according to Bolinger [1972], statement and question contours are similar across a wide range of languages) some patterns communicate different things in different cultures. For example, an intonational contour which conveys flippancy in English does not have this connotation in French, Spanish, or German (Bolinger, 1972).

Nonverbal components are an integral part of a message, so it is important that they be correctly understood. Difficulties arise when people judge others according to the rules of their own culture (Argyle, 1972b). Argyle demonstrated that cross-status differences in communication are similar to those encountered cross-culturally. Such problems are greater in societies with rigid class or caste systems, where opportunities to interact across levels is limited, than in more fluid societies. In comparison with other countries Canada appears to have a fluid class system, but certain groups have traditionally found it more difficult to attain higher-level jobs than others. Although French and English both are official languages, English is firmly entrenched as the working language in the higher echelons of business and industry (Porter, 1965; Royal Commission of Bilingualism & Biculturism, 1968). Since it has been demonstrated that there are some differences in nonverbal behaviour between members of the middle and lower social classes (S. Scherer, 1974; Schmidt & Hore, 1970) as well as between different language groups, there is considerable scope for misunderstanding between English- and French-speaking Canadians. In recent years, whether to help bridge the cultural gap or to improve future employment prospects, increasing numbers of English-Canadian parents across Canada are enrolling their children in French-immersion courses (Lambert, 1979). This is true in Quebec as well, where, be-

cause of recent political changes, increasing numbers of English-Canadian children are being educated in French (D'-Anglejan & Tucker, 1973). However, for real understanding between the two language groups, it is necessary to learn more than the words spoken, or the verbal code. It is necessary to learn the appropriate way to speak in a given situation (Ervin-Tripp, 1972; Hymes, 1971). As Hayes (1964) states:

> The implications of paralinguistics and kinesics for the teaching of cross-cultural communication are enormous. The speaker is free to choose his message. He is not free to choose the code of his message - this is strictly imposed by the language, and it is proper that much time and effort be expended in the efficient learning and teaching of this code. The speaker is, however, free to color his message in certain ways, and these ways are predominately paralinguistic and kinesic. If these signals, differently conditioned by every cultural system, with different effects on the linguistic system, are not properly received and sent, communication is impeded (p.145).

Von Raffler-Engel (Note 10), speaking of kinetic cues, suggests that some are under more conscious control than others. She feels that these cues can lead to gross intercultural misunderstandings. However, with guidance, awareness of these cues and our interpretations of them can lead to correcting or avoiding such misunderstandings. Similarly, if there are misunderstandings based on vocal differences in the expression of emotion across occupational level or cross-culturally, these may likewise be corrected. The first step, however, is to determine whether such differences do exist.

A review of the literature on the vocal communication of emotion is presented next, followed by sections on the vocal correlates of social status, and social class differences in response to incongruent verbal-vocal communications. These are followed by a section on the cross-cultural communication of emotion.

Vocal communication of emotion

Many studies have shown that emotion can be accurately communicated by the vocal channel alone. In an early study, Davitz and Davitz (1959a) had speakers recite portions of the alphabet (thus keeping the verbal channel neutral and constant) while simulating ten different emotions. They found that listeners were able to identify which emotion was being conveyed. This study was a spur to a renewed interest in the vocal communition of emotion. However, it was not the first of its kind. Several in the past had used a similar method, the recitation of letters or numbers, to convey emotion (Dussenberry & Knower, 1939; Knower, 1941, 1945; Pfaff, 1953; Thompson & Bradway, 1950). Although other content-masking techniques are more frequently used, as recently as 1972 Reid and Ware used the above method and obtained similar results to those of Davitz and Davitz (1959a). In all of these studies it was found that judges were able to identify emotions conveyed vocally without the aid of verbal cues. Researchers also found that certain

emotions are easier to convey and identify than others. As will be discussed in a later section, which emotions are more 'obvious' tends to differ from language to language. Other researchers used standard passages emotionally neutral in content and obtained similar results (Beldoch, 1964; Costanzo, Markel & Costanzo, 1969; Kramer, 1964; Fairbanks & Pronovost, 1939; Pollack, Rubinstein & Horowitz, 1960; Zuckerman,Lipets, Koivumaki & Rosenthal, 1975). This was considered closer to real- life communication than the recitation of the alphabet. It was also found that emotion could be correctly identified when speech was rendered unintelligible by compressing it (Boyle, 1970; Goldhaber, 1970; Goldhaber & Weaver, 1968; Orr, 1968) or by randomly splicing it and rearranging the segments, a technique known as random- splicing (Rosenthal,Hall, DiMatteo, Rogers & Archer, 1979; Scherer, 1971).

Another approach to isolating the vocal channel is filtering. Passing speech samples through a low-pass filter eliminates high frequency sounds, mostly consonants, which convey most of the semantic meaning, and leaves the low frequency sounds, mostly vowels, which convey more of the tonal quality of speech (Soskin & Kauffman, 1961). The resulting speech samples sound muffled, as if heard through a wall (Starkweather, 1956). Although the way in which they are spoken is fairly clear, the words themselves are not intelligible. Soskin & Kauffman (1961) found that only two to

three percent of filtered words are understood, and these are mostly articles, conjunctions, and prepositions. Kauffman (1960) found that the emotion conveyed by filtered speech samples could be accurately identified. Kramer (1964) compared the accuracy of identification of emotion in constant, neutral content and filtered speech and found that overall subjects were equally accurate in both conditions. However, the correlation between scores on filtered and unfiltered samples for individual subjects was low ($r=+.16, p>.40$).

Using a variety of methods, then, it has been demonstrated that the vocal channel is an effective conveyor of affect, so much so that when adults are faced with a message that is incongruent in verbal and vocal channels, they frequently resolve it in the direction of the vocal channel (Burns & Beier, 1973; Fujimoto, 1972; Hunt & Lin, 1967; Mehrabian & Wiener, 1967; Starkweather, 1956; Weitz, 1972). However, absolute statements of the superiority of one channel over another in the communication of affect or of personality traits cannot be made, because, as Ekman, Friesen, and Sullivan (1980) demonstrated, the superiority of one channel over another depends on the attribute being measured and on the interpersonal context. This is essentially the same conclusion that was drawn by Brown, Strong, and Rencher (1975) in their review of the literature.

Studies employing the diverse ways of isolating the vocal channel have found that the child's ability to identify emotion on the basis of vocal information improves with age (DePaulo & Rosenthal, 1979; Dimitrovsky, 1964; Fenster, 1967; Gates, 1927b; McCluskey, Note 7). Girls were found to be more accurate at this task than boys (Dimitrovsky, 1964), a characteristic that apparently endures into adulthood (Rosenthal et al., 1979). Both children and adults have been found to identify the negative emotions of anger and sadness more accurately than the positive ones of happiness and love (Costanzo, Markel & Costanzo, 1969; Davitz & Davitz, 1959a; Dimitrovsky, 1964; Fenster, 1947; McClusky, 1980, Note 6). Fenster (1967) suggested that this might be because of the greater negative consequences attendant on misinterpreting negative vocal cues.

In the above-mentioned studies, judges listened to speech samples and indicated which emotion was being conveyed. Other researchers attempted to measure objectively the changes in pitch, intonation, intensity, and rate of speech which characterize the different emotions (Davitz, 1969; Davitz & Davitz, 1959b; Elfred & Price, 1958; Fairbanks, 1940; Fairbanks & Hoaglin, 1941; Fairbanks & Pronovost, 1939; Fonagy & Magdics, 1963; Goldman-Eisler, 1952; Ruesch & Prestwood, 1949). Some examples of this area of research follow.

Scherer (1974) had subjects rate synthesized tone sequences and found that differences in pitch level, pitch variation (intonation), amplitude level and variation, and rate of speech communicate the major dimensions of emotional meaning as measured by the semantic differential (Osgood, Suci, & Tannenbaum, 1957).

In a naturalistic situation, Roescher and Lester (1976) had trained observers make ratings of the amount of fear, anger, depression and total affectivity on a videotape of a psychotherapy patient every twenty seconds during two therapy sessions. Audio recordings of the sessions were then subjected to spectral analysis, yielding graphic displays of pitch and intensity over time (spectrographs). Each time-period spectrograph was rated for mean pitch and amplitude of various peak frequences. They found different parameters for the different affects and were able to predict the judges' ratings of videotapes of the next two sessions from the spectrographic profiles.

Williams and Stevens (1969, 1972) used objective electronic measures to analyze acted and naturally-occurring speech samples in which the emotion expressed was clearly defined (eg. recordings of a pilot before and after learning that a crash was imminent). They found, as did other researchers in the area, that the major acoustical or vocal changes which differentiate the emotions are intonation,

pitch, and rate of speech. In the next section studies revealing differences in these features in the speech of white- and blue-collar workers are reviewed and the implications for the present study discussed.

Vocal correlates of social status

As indicated in the previous section, the way in which we speak betrays more than just the way we are feeling at a given time. Content, grammer, and vocabulary (what we say) may reveal one's education or intelligence and, directly or indirectly, one's social class (Bernstein, 1967; Deutsch, 1965; D'Anglejan & Tucker, 1973; Jay, Routh & Brantley, 1980; Robinson, 1979; Williams & Naremore, 1969; Fogel, Note 11). Similarly, the way in which we speak can be revealing as well (D'Anglejan & Tucker, 1973; Labov, 1966; Loman, 1976; Trudgill, 1974; Williams, 1970). Even with content standardized (Harms, 1961; Moe, 1972; Putnam & O'-Hearn, 1955) or cues drastically reduced, as in the recitation of numbers or letters (D'Anglejan & Tucker, 1973; Ellis, 1967; Moe, 1972), listeners' estimations of speakers' social class correlated highly (approximately .80) with the person's actual social class.

As suggested in the introduction, differences in the linguistic features of a language may limit or modify the paralinguistic or vocal features available for the expres-

sion of emotion (Hymes, 1961; Key, 1975; Starkweather, 1969; Williams & Stevens, 1972). Similarly, basic expressive differences between speakers of different socio-economic levels in neutral situations suggest there may be differences in the vocal correlates of various emotions as well.

Brown (Note 2) and Brown and Lambert (1976) demonstrated what they called 'social status markers' in speech. Recordings of twenty-one French-Canadian and three continental French adolescent boys, as well as their fathers and mothers, (these families representing various categories on the Blishen Occupation Scale [1964]) were played to adolescent boys of three social status groups. These raters were asked to evaluate speakers on several different semantic differential scales and to estimate their social status. Although finer occupational distinctions could not be made, it was found that speakers could be accurately rated as either white- or blue-collar. The factor that tended to differentiate these groups, which Brown labelled 'competence' included such traits as 'intelligent','confident', and 'ambitious'. Brown and Lambert (1976) subsequently played the speech samples of the French-Canadian adult male group to American college students who knew no French and were, therefore, rating on the basis of vocal qualities alone. This group was also able to discriminate white- and blue-collar workers with a high degree of accuracy. Brown and Lambert (1976) argued that social status markers are not

simply stylistic differences that happen to have been associated with a given group (accuracy of discrimination by French- Canadian judges alone would have supported this conclusion). The fact that accurate discrimination could be made by nonspeakers of the language, who would not be sensitive to status pronunciation or dialect, suggests that there are "paralinguistic reflections of motivational, emotional, and personality traits that are characteristic of (or even a cause of) the social or occupational levels "(page 52).

Frender, Brown, and Lambert (1970) identified the vocal qualities associated with competence. They found that grade three French-Canadian boys from blue- collar families, matched on age, socio-economic status, and IQ, could be differentiated into high and low scholastic achievers on the basis of vocal qualities. The high achievers (mean grades of B or better) had a wider and more 'appropriate' intonation range, higher pitch, and quicker rate of speech than children with a mean grade of C or below. It is possible that, rather than reflecting 'true' competence, teachers' perception of their competence as reflected in grades assigned was influenced by students' vocal qualities. (A study by Seligman, Tucker, & Lambert [1973] suggests that voice qualities strongly influence teachers' perceptions of student competence). While ratings of their pronunciation and articulation did not differ, the more competent boys scholastically (perhaps future white-collar workers) were discriminable on the basis of vocal traits.

Frender et al. (1970) carried out linguistic analyses on the speech of naturally-occurring groups differing in competence. In the following studies computer-generated manipulations of speech samples were obtained and the effect of these manipulations on ratings of competence studied. Brown and his colleagues (Brown, Strong, & Rencher, 1973, 1974, 1975; Smith, Brown, Strong & Rencher, 1975) varied the rate, intonation, and pitch on recordings of standard passages read by two or more speakers to look at the effect of these vocal changes on personality ratings. They found that decreasing the rate of speech caused the voices to be rated less competent, and increasing the rate caused voices to be labelled more competent. Increasing or decreasing the rate caused the voices to be rated as less benevolent (the factor name given to traits such as kind, sociable, likeable). Both increased pitch and decreased intonation caused decreased ratings on competence and benevolence. Of all the manipulations, rate had the strongest effect on perceptions of competence, accounting for 86% of the variance in competence ratings, compared to 4%, 3%, and 2% for pitch, intonation, and the interaction between rate and intonation respectively. Once again, perceptions of competence were linked to specific vocal qualities: pitch, rate, and intonation. As described earlier, perceived competence tends to differentiate blue- and white-collar workers, even when judgments are based on vocal qualities alone (Brown & Lam-

bert, 1976; Brown, Note 2). As indicated in the previous section, the same qualities of speech which differentiate competence and social status are also channels for conveying emotions. Since these qualities differ in neutral situations, they may also differ during the expression of emotion. Further, people from different status levels may differ in their interpretation of the same emotional communication and in their estimate of the degree to which a speaker is aroused, because they would be accustomed to hearing different levels of pitch, intonation, and rates of speech in neutral situations.

Other evidence for cross-status differences in the vocal communication of emotion.

Further support for the hypothesis of cross-status differences in vocal communication comes from McCluskey, Niemi, and Albas (1978). Filtered speech samples of both normal and disturbed children (disturbed children were those who had been labelled as such by parents and teachers, and who had been in trouble with the law) were rated by other normal and disturbed youngsters. Although the normal children were more accurate overall in their ratings, there was also a significant sender-by-receiver interaction, with each group rating communication by similar others more accurately. McCluskey et al. speculate that this is due to the fact that individuals who interact most frequently with each other should be able to communicate more effectively:

> Normal children, due to the sharing of a common universe of experience, may become sensitized to certain cues. Similarly, disturbed children likely have a common 'moral career' - - similar learning experiences regarding their plight and similar changes in self-concept (cf. Goffman, 1963). In short, each group shares something the other does not (p.447).

Some support for McCluskey's speculation that increased interaction can facilitate the communication of emotional meaning was found in a study by Zuckerman et al. (1975). Raters were asked to identify the emotion conveyed via facial expression or tone of voice (using content-standard speech). It was found that acquaintance with the encoders improved decoding scores for male subjects. That it did not do so for female raters could be attributed to the fact that females performed better overall than the males. Thus, there may have been a ceiling effect on their scores.

Because people tend to socialize more within than outside of their own socio-economic level (Argyle, 1972a), they may be able to communicate more effectively and more accurately within their own level than across levels.

There is evidence that different social classes employ different dimensions when evaluating speakers on the basis of content- standard recordings (Brown, Note 2). This could reflect attention to different selected speech factors, or it could reflect different dimensions for rating the same vocal factors. In either case, such differential attending

might also result in differential perceptions of the vocal expression of emotion. If, for example, the factors which communicate religiosity are also indicators of emotion, or of particular emotions, those attuned to the dimension of religiousity might be differentially aware of the emotion or emotions.

As well, evidence from studies using the Profile of Nonverbal Sensitivity (PONS) (Rosenthal et al., 1979), which contains sequences of several different nonverbal communication channels, shows that some occupational groups are more sensitive decoders than others. Actors and students studying nonverbal behaviour or visual arts were the most accurate decoders, followed by clinical psychologists, and then business executives and teachers. Buck (1976) found occupational differences in ability to decode facial cues. The high scorers in Buck's study were fine arts majors, comparable to the students in visual arts in the PONS study, and business majors, unlike the business executives above. Buck's low scoring group consisted of science majors.

Some tangential support for social class differences in the vocal communication of emotion is provided by evidence of social class differences in other nonverbal communication channels. Robbins, Devoe, and Wiener (1978) compared the use of nonverbal communication regulators by middle- and working-class speakers. They examined the patterns of indi-

cators that speakers of each group used to signal the initiation, continuation, or termination of a communication exchange, or to signal a speaker shift. The authors assumed that such signals are learned, like other communication components, in the context of social group interactions and would therefore be shared by members of a group. The hypothesis of Robbins et al. that working- and middle-class usage of nonverbal regulators would differ was based on reported differences in verbal communication contents and style. Working-class speakers have been found to talk more about here-and-now, or shared events, and middle-class speakers about not-here, not-now, not-shared events; that is, summarized or related events (Bernstein, 1971; Schatzman & Strauss, 1966). Because middle-class speakers are not as likely to be talking about shared, on-going events, it was hypothesized that they would require a more complex set of communication regulators. It was hypothesized that middle-class speakers would require signals to solicit cues of listener comprehension, speaker continuation (the intention to continue speaking after a pause), and speaker shift (opening the floor to the listener). Working-class speakers were hypothesized to rely mainly on speaker-shift signals, because shared events should require less feed-back of listener comprehension, and, being more spontaneous, require less signals for floor-holding for thinking time. Robbins et al. further hypothesized that because the regulators of

middle-class communicators must serve a wider range of functions, each must be more precise or limited in meaning to differentiate it from the others. In contrast, because working-class speakers use mainly one regulator category, that of speaker-shift, there can be more variability of components within that category.

Videotapes were made of students responding to open-ended questions about a cartoon they had just seen. Their responses were scored for the occurrence of three behaviours: pauses of half a second or longer, eye contact, and inflection shift variations before pauses. Pauses were designated as filled if a nonverbal utterance, such as 'uh', occurred in it, or unfilled. Both the absolute rate of occurrence and the rate per minute speaking time of each of the indicators were analyzed. The hypotheses were supported. When speaking to a middle-class researcher, working-class speakers emitted more upward or unchanged inflections before pauses than middle- class speakers. Middle-class speakers emitted more downward inflection shifts before pauses than working-class speakers. The investigators speculated that middle-class listeners, such as teachers, might label the upward inflection of the working-class speaker as indicating tentativeness or uncertainty, whereas the working-class child might consider this the appropriate tone to use with a teacher. The authors also wondered whether the working-class listener might not be troubled by the asser-

tiveness implied by the downward inflection of the middle-class speaker, which, to a middle-class listener, might simply represent the tone of an information exchange. Robbins et al. also found that middle-class speakers emitted more 'floor-holding' signals, such as filled pauses, than working-class speakers. Working-class speakers emitted a greater variety of regulators that were considered ambiguous. That is, it was not clear whether the speakers were planning to continue speaking or not. The authors noted, however, that what is ambiguous to a middle-class listener might not be so to a working-class one.

The above study is relevant for two reasons: the reported differences in the vocal communication of middle- and working-class speakers and the authors' comments on the ambiguity of some of the working-class speakers' nonverbal communication to a middle-class listener. Examples of differences in other nonverbal channels follow.

An incidental finding of Gates (1927a) in her investigation of the development of sensitivity to emotion as expressed in posed photographs was that higher social status children performed better than those of lower social status.

Two studies reported social status differences in interpersonal distancing in children. Middle-class white children were found to maintain greater distance between themselves in a conversation than did lower-class black or

Puerto Rican children (Aiello & Cooper, 1972). Although in this study social class and race may have been confounded, S. Scherer (1974) compared lower- and middle-class white and black children and and found that middle-class children stood further apart than lower-class children regardless of race.

Schmidt & Hore (1970) and Hore (1970) found differences in the amount of physical contact and mutual eye contact between mothers and pre-school children of different social classes.

Bernstein (1959, 1962, 1965, 1967, 1970) suggested that lower-class children are less verbally adept than middle-class children, and are therefore forced to rely more on the nonverbal components of communication. He assumed that middle-class children would be equally adept at communicating in either the verbal or nonverbal channels, or in his terms, the elaborated or restricted codes. Bernstein's writings spurred a great deal of research on social class differences in <u>verbal</u> communication with varied results. While there do appear to be social class differences in grammatical structure (Bernstein, 1967; Deutsch, 1965), these are not consistently related to verbal communication accuracy. Edwards (1976) and Higgins (1976) provided comprehensive reviews of this area. While most of the research testing Bernstein's assumptions has focussed on verbal differences across social

class, a few studies have been conducted to test his assumptions about lower-class over-reliance on nonverbal components.

In the only study to compare directly the vocal communication of emotion across social status groups, Schneider (Note 12) found that lower-class children, between the ages of 7.5 and 11.5 years, were more accurate than middle- class children at decoding vocal emotion. With lower-class, lower IQ children, there was a correlation between age and accuracy. Among middle-class children there was no correlation between age and IQ or accuracy.

One last line of research which brings tangential evidence to bear on the possibility of cross-status vocal differences in the communication of emotion will now be considered. This research, also conducted to test Bernstein's assumptions, revealed social class differences in response to incongruent verbal-vocal communications.

Social class differences in response to incongruent communication.

Brooks, Brandt, and Wiener (1969) predicted that if lower-class children are less verbally adept than middle-class children (Bernstein, 1967; Deutsch, 1965), they would respond more to praise delivered with inflection (ie. positive messages in both verbal and vocal channels) than to praise delivered in a neutral tone of voice (positive message in

verbal channel alone). They predicted that there would be no difference in the performance of middle-class children under these two conditions, since for them the verbal component is supposed to be predominant. The subjects were 108 male and female kindergarten children who performed a game-like task and were reinforced via earphone for target behaviours. The lower-class group which received inflected reinforcement showed a sharp rise in performance over time which was not equalled by any of the other groups. In a second study, Brooks et al. (1969) added a negative reinforcement verbal condition and negative inflection. There were thus two verbal conditions, positive (the words 'good' and 'right') and negative ('bad' and 'wrong') and three vocal conditions (positive, neutral, or negative inflection). Some children heard congruent messages (verbal and vocal components both positive or both negative), some heard incongruent messages (valence of verbal channel opposite to that of vocal channel), and some heard noninflected messages (verbal channel positive or negative, vocal channel neutral). It was found that middle-class children responded the same to congruent reinforcers, positive or negative, as to noninflected reinforcers. However, for the middle-class child incongruent reinforcers tended to cancel each other out, producing little systematic response to reinforcement. This would suggest that they gave equal weight to the verbal and nonverbal components. The lower-class children respond-

ed only to the inflected conditions, with a stronger response to the positive congruent than to the negative congruent condition. In the incongruent conditions it had been predicted that the lower social-class child would respond to the vocal message. However, they responded to the verbal component. The authors suggested that for the lower socio-economic child tone functions as a language 'marker' or signal, directing the child to pay attention to the verbal component. (In the negative condition it could be thought to be the 'I mean business' tone of voice.) When there was no marker, no response was made to the verbal channel. Lower social status children responded most to the positive congruent messages, presumably because of the double positive component, whereas the response of the middle social status children in this condition was attributed to the congruence of the message, rather than the valence. These studies suggest that middle- and lower-class children utilize the information in the vocal channel differently.

Using the same task as the above studies, Kashinsky and Wiener (1969) varied the instructions given to five and six year old lower and middle socio-economic status children. They combined constant verbal instructions with either positive, negative, or neutral intonation, and measured latency of response. Although overall the latency time for middle-class children was shorter than for lower-class children, they found that lower-class children responded more quickly

in the positive tone condition and relatively the same in the other two conditions. The middle-class children's performance was essentially the same across conditions.

Brooks (Note 3) investigated the differential response of middle- and lower-class adults to congruent and incongruent reinforcers. Positive and negative verbal reinforcers were spoken in positive, negative, or neutral tones during a simple learning task. It was found that with middle-class adults learning occurred in response to the reinforcement in all of the verbal-vocal combinations. With lower-class adults, however, learning occurred only when the verbal reinforcement was combined with positive or negative tones. There was no learning when the tone was neutral. For lower socio-economic class adults, then, as well as children, tone appears to function as a communication marker or signal, directing attention to the verbal component.

To summarize, the vocal channel has been found to convey social status markers (Brown & Lambert, 1976; Brown, Note 2). Pitch, rate, and intonation, the vocal variables which determine perceptions of competence (Brown et al., 1973, 1974, 1975; Frender et al., 1970; Smith et al., 1975) appear to differentiate white- and blue-collar workers in neutral conditions. Since these features are also the variables involved in the vocal communication of emotion, it seemed possible that the vocal communication of emotion would also differ across social status levels.

Occupational differences in the ability to identify emotions (Buck, 1976; Rosenthal et al., 1975) and cross-status differences in the expression of emotion in other nonverbal modalities have been reported (Robbins et al., 1978; S. Scherer, 1974; Schmidt & Hore, 1970). In addition, children and adults of lower and middle social status were found to respond differently to incongruent verbal-vocal communications. These findings, from divergent lines of research, suggested that there might be cross-status differences in the production and perception of vocally-communicated emotion.

Cross-cultural communication of emotion

As noted earlier, the more similar two languages are, the more similar are the vocal features available for the communication of emotion. However, the same elements may be used differently in different languages to convey emotion (Bolinger, 1972). Therefore, structural language differences, as well as less communication between than within cultural-linguistic groups may result in vocal differences in the communication of emotion.

Although, as the following studies show, emotions rated cross-culturally are usually identified with an accuracy that is above chance overall, the level of accuracy is usually lower than that of ratings by the same cultural group

as the sender. Further, the order of ease with which emotions are identified differs across groups.

An incidental finding by Kramer (1964) was that the pattern of errors on judges' identification of emotion in a foreign-language speaker was different than that obtained when English-speaking listeners identified the emotion conveyed in filtered or nonfiltered English samples. Kramer compared three methods of eliminating the effect of verbal cues on the identification of vocal emotion: constant content, filtering, and the use of foreign speech. The same subjects served in all three conditions, functioning as their own controls. Six English speakers portrayed anger, contempt, grief, indifference, and love by enacting appropriate scenes, each of which contained an identical statement, neutral in content. The excerpted neutral statments provided the constant content stimulus, which was then rerecorded and filtered. In addition, the scenes were translated into Japanese and performed by three Japanese speakers who each listened to his own and each others' tapes and rated them as to how well they conveyed the desired emotions.

In the English nonfiltered condition the emotions were identified correctly more often than not. The most common error was the confusion of grief with love, similar to the findings of Davitz and Davitz (1959a) and Fairbanks and Pronovost (1939). With filtered speech, the patterns of suc-

cesses and failures were similar, except that contempt was more often labelled as indifference. Chi-square comparisons of accuracy of ratings of Japanese speech showed it to be beyond chance ($p<.001$), but the error patterns differed from those in English speech. Grief was the easiest to judge, with indifference and anger next. Love was mistaken for indifference more often than it was correctly identified, although it was still correctly identified above chance level. Although as a whole subjects were equally accurate in filtered and nonfiltered conditions, for individual subjects correlations between scores on filtered and unfiltered speech were low ($r=+.16, p<.40$). Correlations between scores on filtered speech and on Japanese speech were higher ($r=+.35, p<.05$). Kramer suggested that there may be individual differences in how well people can judge emotion under different or 'strange' conditions.

Beier and Zautra (1972) played tapes of American speakers conveying six different emotions: happiness, fear, sadness, anger, indifference, and flirtatiousness, to groups of Polish and Japanese non-English-speaking students and a group of American students. As expected, the Americans were the most accurate decoders. Polish subjects showed 53% agreement among themselves and 53% agreement with American ratings. Japanese subjects showed 57% agreement among themselves and 48% agreement with American ratings. The accuracy rates for the different emotions were not the same across

groups. The order of accuracy, from most to least, was: Americans - happiness, anger, flirtatiousness, indifference, fear, and sadness; Polish - anger, indifference, fear, sadness, happiness, and flirtatiousness; Japanese - sadness, indifference, anger, fear, happiness, flirtatiousness. The order of accuracy for Japanese subjects rating English speakers is strikingly similar to that of English subjects rating Japanese speakers (Kramer, 1964). This would indicate that sadness, indifference, and anger are communicated similarly in Japanese and English but that other emotions differ to a greater extent.

The results of the Japanese raters in the above study (Beier & Zautra, 1972) are of particular interest. The fact that there was a higher degree of agreement among themselves than with the American raters (57% vs. 48%) suggests that particular English vocal patterns are consistently mistaken for those of different emotions in Japanese.

In two unpublished studies (Buchman, Note 13; Kretsch, Note 8) speakers of different cultural groups attempted to convey emotion while reciting the alphabet. The findings of Kretsch (Note 8) support those of Kramer (1964) and Beier and Zautra (1972), in that while correct identifications were made beyond chance in both of the foreign languages, the ability to convey or perceive particular emotions differed across groups.

Kretsch (Note 8) used 30 Japanese, American English, and Hebrew speakers to convey anxiety, happiness, love, anger, and sadness. He found that all groups of listeners identified the emotions of each group of speakers beyond chance. There were national differences in encoding and decoding ability, and interactions between particular emotions and groups. Americans were found to be the most accurate raters; Israelis the most accurately-rated speakers. Japanese speakers received the least accurate ratings, both within and between groups. Some emotions were communicated more accurately across groups than within, such as anger for the Americans and love for the Japanese, a finding which is difficult to interpret. This study suggests that communication difficulties may be subtle. While many elements of a conversation may be correctly understood, some components may still be missed or misunderstood.

Buchman (Note 13) investigated culture, sex, and mode of communication (facial, vocal, and combined). Ninety black, white, and Puerto Rican students from the same community college expressed anger, anxiety, happiness, love, or sadness by reciting the alphabet to similar groups of raters. Each speaker first recited a neutral alphabet as a baseline. No cultural differences were found, a fact that Buchman felt could have been due to the high intergroup interaction rate at the college. Because the samples were unfiltered, cues to the cultural background of the speakers were available. Although the groups may have expressed emotions differently,

familiarity with the different groups' styles of communication led to the correct judgment of speaker intent. The prior recitation in a neutral tone may have also facilitated the task for raters.

St. Martin (Note 5) videotaped white American speakers communicating sadness, disgust, anger, surprise, happiness, and fear while counting. White and black American, Latin American, and Malaysian subjects rated either video, audio, or audiovisual channels. Ratings were made on nine bipolar adjective scales representing the factors of pleasure, arousal, and dominance. An effect was found for culture of decoder. Surprisingly, the largest differences were between black and white Americans, and the least differences between black Americans and Latin Americans. The emotions which were rated differentially by the different cultural groups were sadness, anger, surprise, and fear.

Albas, McCluskey, and Albas (1976) played filtered speech samples of white English-speaking Canadians and Canadian Indians whose first language was Cree to white and native judges. The speakers were attempting to convey happiness, sadness, love, and anger. Judges did not know to which group they were listening. There were no main effects for speakers or receivers, but there was a significant interaction, in that each group rated communications in its own language more accurately. The authors suggested that

in order to understand someone from another culture you must be able to put yourself in the other's frame of reference. Raters could not do this because they did not know they were rating speakers from another culture. They likely rated each sample according to what such a communication would mean coming from a speaker from his own language group. It is possible, however, that if they were familiar with speakers of the other language group they might have learned the vocal signals as well as the vocabulary, an hypothesis supported by Buchman (Note 13). It is possible that in a condition in which each group knew it was listening to speakers from the other, the native group scoring whites would be more accurate than the whites scoring natives, since Crees are probably spoken to more frequently in English than whites are in Cree. They would have had more opportunity to learn the vocal cues.

Solomon and Ali (1975) compared the influence of the vocal channel on meaning-attributes of first and second language speakers. Adolescents in America and India listened to reinforcer statments combining three levels of content (positive, neutral, or negative) and three levels of intonation (pleased, indifferent, or displeased). They were told that the statements were by an art teacher to her pupil and were asked what the teacher meant about the quality of the drawing, how the child felt, and whether the teacher liked him. They found that raters for whom English was a second

language tended to make less use of intonation in judging affective meaning. For the American groups, content, intonation, and the content by intonation interaction were significant for all three questions ($p<.001$). For the Indian groups, content was signicant ($p<.001$), but intonation and the content by intonation interaction were not. Solomon and Ali (1975) compared the performance of the Indian students to that of a previous, younger sample of North American fourth grade students (Solomon & Ali, 1972) and attributed the similarity to their relative inexperience with the language. The inexperience, they felt, led them to focus all their attention onto the content of what was said and to deemphasize the way it was said.

With second-language learners, then, there are two possible explanations for why the vocal component may be misunderstood. One is that concentration on what is being said leads to an ignoring of the vocal component. The other is that the vocal component is being interpreted incorrectly due to differences between it and vocal patterns in the speaker's first language. Of course, some combination of these factors may be the case. The relative weight of each in the explanatory process may depend on the similarities between the vocal channels of the two languages.

Several studies have been conducted comparing English-Canadian and Mexican speakers and raters. In an age-wise

comparison of Mexican and English-Canadian children, and a young adult group (mean age 22), McCluskey, Albas, Niemi, Cuevas and Ferrer (1975) found that at each age level the Mexicans were more accurate judges of filtered speech samples than were their Canadian counterparts. Furthermore, it was found that the speech samples of Mexican speakers were more accurately received by both Mexican and Canadian subjects than those of the Canadian speakers. That is, the emotion conveyed by Mexican speakers was correctly labelled more often. These results were replicated by McCluskey (Note 6) in a study which extended the age range of subjects to include adults of three age groups (mean ages 25, 45, and 65). Thus, these results are consistent across a wide range of ages.

In another developmental, cross-cultural study (McCluskey & Albas, 1978) it was found that at each age level Mexican children tended to respond more negatively than Canadian children to contradictory messages (the words conveyed one emotion, the voice qualities another) spoken in their own languages. On the basis of these studies the authors suggested that the Mexican life style may be more emotional than that of English-Canadians, and that Mexican children are more attuned to verbal and vocal emotional cues from an early age.

Differences in nonverbal communication among English- and French-speaking Canadians.

Like Mexicans, French-Canadians are commonly viewed as more emotional than English-Canadians. In a series of studies using the stereotype differential, a variation of the semantic differential (Osgood, et al., 1957), English-Canadians were found to attribute characteristics such as emotional, colourful, and impulsive to French-Canadians while attributing to themselves traits such as intelligent, loyal, important, and placid (Gardner, Taylor & Feenstra, 1970; Gardner,Wonnacott & Taylor, 1968).

Although their studies were not primarily concerned with the communication of emotion, support for the notion that French- and English-Canadians do actually differ in their nonverbal communication was found by von Raffler-Engel (1975, 1978) and LaCroix and Rioux (1978).

Von Raffler-Engel (1975, 1978) studied the gestural behaviour of French- and English-Canadians in an interactional setting. Bilingual children in grades one and two were videotaped while participating in in-group and out-group dyads. One child in each dyad was told a story and was asked to repeat it and to comment on it to the second child. On the basis of her observations von Raffler-Engel claimed that the kinesthetic systems of French- and English-Canadian bilingual children differ from each other (e.g., the

French-Canadian child leans toward his partner while the English- Canadian child leans back and stretches out his legs to signal readiness for an informal chat). Although each child spoke two different languages, he or she had but one basic kinesthetic system. However, von Raffler-Engel found that French-Canadians tended to modify their kinesthetics according to the culture of their partner. Therefore, whether speaking in English or French to an English-Canadian, they used a reduced version of their kinesthetics, which they did not do when speaking English to another French-Canadian. When English-Canadian children spoke French to either French- or English-Canadians they maintained their own kinesthetic system but appeared to copy features of the French kinesthetic system at random and in an exaggerated manner; the more so if they were not fluent in French. The younger English- and French-Canadians, like their older counterparts in the following study, tended to be distinguishable along cultural lines, rather than according to the language they were speaking. That is, their nonverbal (in this case, kinesthetic) system appeared more fundamental than the words spoken. Interestingly, in this study the French-Canadian children appeared more aware of the need to modify their style when communicating with someone of another cultural group than did the English-Canadian children.

LaCroix and Rioux (1978) videotaped French- and English-Canadian bilinguals reading a passage once in French and

once in English. In the video condition the audio was turned off and speakers were shown from the neck down. Faces were left out of the images so that lip-reading could not be used to tell which language was being spoken. Judges rated the speakers on 20 traits, some of which referred to emotion (happy, sad, hostile) while others concerned broader personality traits, such as masculine - feminine and introversion - extroversion. The authors wished to determine whether nonverbal behaviour varies as a function of culture of origin, whether it is possible to tell which language a bilingual speaker is using from nonverbal behaviour alone, and whether culture of origin influences one's evaluation of nonverbal communication. LaCroix and Rioux found that regardless of the language in which they were speaking, French-Canadians were rated differently than English-Canadians in the direction of the popular stereotype, but on the gestural level alone. That is, kinesthetically they were perceived to be more excitable, open, and active than the English-Canadians. However, the language spoken could not be identified by gestural communication alone. Rather, judges appeared to be guessing, and very accurately indeed, according to cultural origin of the speaker. Differences between French- and English-Canadians on the gestural level were, therefore, very marked. Ratings of the audio recordings (nonfiltered speech) revealed no differences for speakers' culture of origin or language spoken. There was, how-

ever, an effect for the culture of origin of the judge, with French-Canadians tending to rate speakers as more nervous and unpleasant on the basis of both video and audio samples than the English-Canadian judges.

It would appear, then, that even fairly fluent Canadian bilinguals do not adapt their nonverbal behaviour when speaking in their second language. Regardless of the language spoken, bilinguals tend to use the nonverbal gestural communication of their cultural-linguistic origin. They also interpret nonverbal behaviour, both gestural and vocal, according to their culture of origin. The fact that no vocal differences were found may have been due to the nature of the task with which the speakers were presented, a reading task. Vocal differences, if they do exist, may be more subtle than gestural differences, and may not be as marked in neutral as in emotional situations.

Methodological issues

There are two major methodological issues in research on the vocal communication of emotion: isolating the vocal channel and the criterion for accuracy of judgment of the emotion conveyed. Research relating to these issues will be discussed, with the implications for the present study.

Isolating the vocal channel. The different methods of isolating the vocal channel either result in some loss of emotional information or in less than complete vocal isolation. Reading a standard passage to hold the verbal portion constant allows pronunciation, articulation, and reading fluency rates to influence ratings, unless the raters do not understand the language spoken, as in the study by Brown and Lambert (1976). With such a method, of course, it is impossible to mask which language is being spoken. The recitation of nonsense syllables avoids the use of any language but its artificiality may result in the loss of intonational information, which conveys emotional (Williams & Stevens, 1969;1972) and social status information (Brown et al., 1973, 1974, 1975; Smith et al., 1975).

Scherer, Koivumaki, and Rosenthal (1972) compared two content- masking methods, random-splicing and filtering. Each technique causes the loss of certain kinds of information. Random-splicing (Scherer, 1971), which breaks the flow of speech and randomly rearranges speech segments, can minimize pauses, break up intonational patterns, and, to some extent, mask rate of speech. In filtering speech high frequencies cues are lost. Scherer et al. (1972) had two actors enact ten segments of a play wherein they expressed anger, fear, happiness, sadness, and matter-of-factness. Subjects labelled each segment and also rated it on twenty semantic differential variables representing the evaluation,

activity, and potency dimensions, as well as some acoustic dimensions. There was a tendency to perceive emotion as more positive in the random-spliced segments and more passive in the filtered segments. Scherer et al. claimed that electronic filtering preserves more of the cues available for the identification of emotion, which, ironically, leads to slightly lower reliability rates. They explain this seemingly contradictory finding in the following way. When there are more cues available, it is possible to have conflicting cues within a segment, or various interpretations of incongruent combinations. The cues left after filtering may be more ambiguous in terms of the possible inferences which could be drawn. The authors also suggested that the cues remaining after filtering may carry socio-linguistic information. If that is the case, filtering would appear to be a better content-masking technique for cross-cultural, cross-status research.

Like Scherer et al. (1972), McCluskey (Note 7) found an interaction between speech condition (filtered or nonfiltered) and emotion portrayed. Anger and happiness, which tend to be portrayed in a more active, lively manner, were judged more accurately in the nonfiltered than in the filtered condition. For sadness and love, which tend to be expressed in a more passive manner, the difference in accuracy of identification was much smaller (and for love, at least, not significant). The author suggested that the extreme vo-

cal cues which accompany the more active emotions (ie., greater tonal variation) are lost with filtering. (This is consistent with the findings of Scherer et al. [1972].) Filtered samples would, therefore, sound less active than the nonfiltered samples from which they are made and would elicit more passive interpretations. If more passive interpretations are made, the passive emotions are more likely to be correctly identified when they are played. Indeed, at all ages children hearing the filtered samples were more likely to identify the emotions as sad or loving than happy or angry.

Although filtering does produce a loss of information which sometimes (Scherer et al., 1972) but not always (McCluskey, 1974) results in reduced accuracy of adults' ratings, interpretations of filtered speech are still more accurate than they would be by chance alone. In some experimental situations, such as the present one, filtering has many advantages. It allows speakers to choose whichever words they wish to convey a particular emotion (eg., McCluskey, 1974). This results in a less artificial situation than when speakers must recite the alphabet or a neutral passage to control the verbal channel. As well, filtering speech eliminates or lessens accents and pronunciation differences, and can mask language spoken when these factors may influence the study. Therefore, in many experimental situations the advantages of filtering outweigh the costs.

Criterion for accuracy of judgment. The criterion for correctness of labelling was also considered. In most studies on the vocal communication of emotion, speakers were simply asked to convey the various emotions and judgments were considered accurate if they coincided with what the speaker attempted to project (McCluskey, 1974; McCluskey et al., 1974). Thus, the criterion of correctness was the speakers' intent, and not an external, objective measure. In studies where the raters were children, adult judgments of the emotion conveyed were typically the criterion of correctness (Dimitrovsky, 1964).

A relevant question is whether a speaker's intent is a sufficient criterion and whether acted emotions are similar to the real-life expression of emotion on objective measures of voice quality. Williams and Stevens (1972) had three actors perform a specially written piece in which certain phrases were spoken by each of the characters in different emotional contexts. The actors rotated through the roles so that each actor voiced the phrases in each situation. They found that spectrographic analyses of acted samples of the different emotions were consistent with samples of the corresponding emotions drawn from real situations. For example, vocal changes which took place during the portrayal of fear were consistent with changes noted in the recording of a Soviet cosmonaut under conditions where fear was to be most expected.

In a further comparison of acted and real-life emotion, Williams and Stevens (1972) had an actor read the transcript of a radio announcement describing the arrival of the Hindenburg just before and after it burst into flames, and compared it with an actual recording of the announcement. Objective comparisons of excerpts of the radio broadcast and the acted sample revealed impressive similarities in the amount and direction of vocal changes before and after the disaster occurred. Both the actor and the announcer showed a marked increase in pitch and intonation for the emotional situation, although these increases were greater for the actor than the announcer. The authors concluded that data obtained from real-life emotional situations were consistent with data from the actors in their study.

In two studies of a series, Huttar (Note 14) also investigated the question of whether acted speech is similar to naturally-occurring speech on objective dimensions. For naturally-occurring speech he recorded many hours of academic lectures, from which he extracted short phrases, neutral in content, from passages where the emotional context was clear. The acted samples consisted of a standard, neutral phrase extracted from passages conveying the appropriate emotions. Listeners rated the pitch, rate, and loudness of the samples and objective measures of these dimensions were made. Huttar found that the acted and naturally-occurring samples of happiness and sadness were similar on all dimen-

sions; the samples of fear were similar in rate and pitch but differed in intensity (this could reflect actual differences in intensity in the situations sampled and acted); the samples of anger differed in pitch but were similar in intensity and rate. Like Williams and Stevens (1972) Huttar concluded that there were enough similarities between acted speech and naturally-occurring speech to justify the use of acted speech in studies on the vocal communication of emotion.

The above studies lend increased support to the assumption that a speaker who intended to convey a particular emotion, and who is satisfied that he did so successfully, has, in fact, produced a sample that is acoustically similar to what he would have produced naturally. Therefore, in this study, speaker intent was used as the criterion of accuracy.

Appendix B

Personal Information Questionnaire

Age:

Sex:

Language spoken at home:

Occupation:

What is/was father's occupation?

What is/was mother's occupation?

Appendix C

Rating Forms

Indicate, beside the name of the emotion expressed, the extent to which the speaker was feeling that way. 1 2 3 4 5

Very Slightly — Moderately Intensely — Very Intensely

1. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

2. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

3. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

4. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

5. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

6. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

7. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

8. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

9. anger-------1 2 3 4 5
   happiness---1 2 3 4 5
   love--------1 2 3 4 5
   sadness-----1 2 3 4 5

10. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

11. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

12. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

13. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

14. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

15. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

16. anger-------1 2 3 4 5
    happiness---1 2 3 4 5
    love--------1 2 3 4 5
    sadness-----1 2 3 4 5

Appendix D

Instructions to Participants

General instructions

This study is concerned with the vocal communication of emotion. Vocal communication refers not to what is said, but to the way something is said. Research has shown that speakers of different languages express emotion somewhat differently. It is possible, therefore, to understand the words that are spoken but not understand the feelings underlying them. For example, there is an intonational pattern which expresses flippancy in English, but which does not have that connotation in French, Spanish, or German. An English speaker hearing that intonation in another language could underestimate the seriousness of the speaker, unless he is aware of the vocal differences between the languages.

This study is particularly interested in the vocal communication of emotion between English- and French-Canadians. These groups have already been shown to differ in other kinds of nonverbal communication, for example, the gestures they use and the degree of physical closeness they are comfortable with when talking. Also, each group uses its own standards to interpret the behaviours of the other. There-

fore, because there are differences in vocal communication between English and other languages, and because there are other differences in nonverbal communication between French- and English-Canadians, it is believed that the vocal expression of emotion by native speakers of these languages might also differ. If so, there are implications for second-language learning.

We would appreciate your assistance in exploring this question. Participation is this study will require about 20 minutes, after which the research assistant will be happy to discuss the study further and to answer any questions you may have. Also, if you will leave your name and address on the envelopes provided, we will send you a copy of the results of this research when the data have been analyzed. Before continuing with instructions, I would like you to please take a few minutes to answer some questions about yourself. This information will be kept confidential. You do not have to put your name anywhere on this form. ... If everyone is finished, I will continue.

As I said, I am interested in the way English- and French-Canadians express feelings. So that you will not be distracted by the words, the speech samples you will be listening to will sound muffled, like voices heard through a wall. I would like you to listen to each speech sample and decide two things: which emotion the speaker is feeling and how strongly he feels that way.

You have each received a booklet with sections in which to record your impressions of each emotion. For each sample you hear, there is a list of four emotions to choose from, followed by a 5-point scale on which to indicate the strength or intensity of that feeling. Please rate only one emotion, the main emotion expressed, in each sample.

Now, let us consider some examples. If you hear a sample that sounds angry to you, you would decide how angry the speaker sounded and circle a response on the scale beside 'angry'. If he was just slightly angry, you would circle 1; if extremely angry, 5; moderately angry, 3; and so on. Similarly, if you decide that a speaker was sad, you would decide how sad he sounded, and make your rating on the scale following 'sad'.

Each speech sample will be played only once, and you will then have 20 seconds to decide which emotion it was and to record your impression of the intensity of feeling on the appropriate scale.

Are there any questions?

Instructions preceding tape with identified samples

This section of the study contains samples of both French and English speakers. Because you will not be able to distinguish which language you are listening to, you will be told before each sample which language it is in.

If everyone is ready, we will begin.

Instructions preceding tape with nonidentified samples

This section of the study contains samples which are in _____ (the subjects' first language). If everyone is ready, we will begin.

Appendix E

Repeated measures analysis of variance: Accuracy of emotions scores

TABLE 15

Mean accuracy scores obtained by raters on each type of stimulus

	RATERS				
	White-Collar Anglo-Phone n=46	Blue-Collar Anglo-Phone n=24	White-Collar Franco-Phone n=30	Blue-Collar Franco-Phone n=53	Marginal N=153
Stimulus Type*					
EWIA	1.26	1.33	1.26	1.24	1.26
EWIH	1.04	0.83	0.90	0.84	0.91
EWIL	0.50	0.45	0.60	0.58	0.54
EWIS	1.15	0.95	0.83	0.84	0.95
EWNA	1.32	1.20	1.13	1.24	1.24
EWNH	1.00	0.83	0.80	0.66	0.81
EWNL	0.65	0.70	0.46	0.62	0.61
EWNS	0.95	0.70	0.86	0.94	0.89
EBIA	1.54	1.50	1.40	1.33	1.43
EBIH	0.60	0.50	0.53	0.64	0.58
EBIL	0.65	0.91	0.80	0.69	0.73
EBIS	1.13	1.16	0.86	1.15	1.09
EBNA	1.34	1.37	1.40	1.41	1.38
EBNH	0.65	0.58	0.80	0.69	0.68
EBNL	0.97	1.04	0.73	0.52	0.78
EBNS	1.04	1.08	0.96	1.16	1.07
FWIA	0.73	0.66	1.06	0.84	0.83
FWIH	1.02	0.70	0.83	1.18	0.99
FWIL	0.50	0.37	0.33	0.43	0.42
FWIS	0.58	0.37	0.30	0.45	0.45
FWNA	0.76	1.08	0.63	0.79	0.79
FWNH	1.08	0.83	1.06	1.15	1.06
FWNL	0.52	0.58	0.30	0.47	0.47
FWNS	0.43	0.58	0.36	0.67	0.52
FBIA	0.56	0.37	0.50	0.75	0.58
FBIH	0.13	0.08	0.16	0.24	0.16
FBIL	0.89	0.87	0.90	0.62	0.79
FBIS	1.08	1.12	1.00	1.00	1.04
FBNA	0.63	0.41	0.66	0.83	0.67
FBNH	0.13	0.16	0.16	0.30	0.20
FBNL	1.04	0.83	0.73	0.69	0.83
FBNS	0.95	1.04	1.20	1.09	1.06
Marginal	0.84	0.79	0.76	0.81	0.81

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
I = Identified, N = Nonidentified,
A = Anger, H = Happiness, L = Love, S = Sadness

TABLE 16

Standard Deviations on Accuracy Scores

Stimulus Type*	RATERS: White-Collar Anglo-Phone n=46	Blue-Collar Anglo-Phone n=24	White-Collar Franco-Phone n=30	Blue-Collar Franco-Phone n=53
EWIA	0.64	0.63	0.63	0.64
EWIH	0.75	0.81	0.80	0.74
EWIL	0.58	0.72	0.62	0.60
EWIS	0.69	0.75	0.69	0.74
EWNA	0.55	0.72	0.68	0.70
EWNH	0.73	0.76	0.71	0.70
EWNL	0.60	0.55	0.50	0.68
EWNS	0.59	0.69	0.50	0.74
EBIA	0.54	0.65	0.62	0.70
EBIH	0.64	0.58	0.57	0.68
EBIL	0.64	0.77	0.71	0.74
EBIS	0.71	0.63	0.86	0.76
EBNA	0.67	0.64	0.49	0.63
EBNH	0.67	0.65	0.61	0.54
EBNL	0.68	0.69	0.69	0.57
EBNS	0.69	0.71	0.71	0.75
FWIA	0.68	0.81	0.69	0.71
FWIH	0.71	0.62	0.64	0.68
FWIL	0.62	0.64	0.54	0.53
FWIS	0.71	0.49	0.53	0.66
FWNA	0.73	0.71	0.71	0.74
FWNH	0.81	0.56	0.44	0.69
FWNL	0.69	0.77	0.53	0.63
FWNS	0.58	0.71	0.49	0.70
FBIA	0.65	0.64	0.57	0.80
FBIH	0.34	0.28	0.37	0.47
FBIL	0.64	0.67	0.75	0.71
FBIS	0.55	0.74	0.58	0.70
FBNA	0.64	0.50	0.60	0.69
FBNH	0.34	0.38	0.46	0.54
FBNL	0.69	0.70	0.63	0.77
FBNS	0.59	0.69	0.71	0.68

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
I = Identified, N = Nonidentified,
A = Anger, H = Happiness, L = Love, S = Sadness

TABLE 17

Summary Table

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
Rater Language(L)	0.57	1	0.57	1.00
Rater Status(S)	0.00	1	0.00	0.00
L x S	2.78	1	2.78	4.82
ERROR	86.00	149	0.57	
Speaker Language(T)	78.60	1	78.60	128.74**
T x L	1.87	1	1.87	3.07
T x S	0.14	1	0.14	0.24
T x L x S	0.51	1	0.51	0.84
ERROR	90.98	149	0.61	
Speaker Status(C)	0.99	1	0.99	2.21
C x L	0.08	1	0.08	0.19
C x S	0.00	1	0.00	0.00
C x L x S	0.95	1	0.95	2.13
ERROR	67.08	149	0.45	
T x C	2.45	1	2.45	5.16
T x C x L	0.04	1	0.04	0.08
T x C x S	1.13	1	1.13	2.38
T x C x L x S	0.01	1	0.01	0.03
ERROR	70.79	149	0.47	
Identified/ Nonidentified(I)	0.48	1	0.48	1.19
I x L	0.08	1	0.08	0.20
I x S	0.33	1	0.33	0.83
I x L x S	0.02	1	0.02	0.07
ERROR	60.70	149	0.40	
T x I	0.75	1	0.75	2.48
T x I x L	0.05	1	0.05	0.18
T x I x S	0.67	1	0.67	2.22
T x I x L x S	0.10	1	0.10	0.34
ERROR	45.61	149	0.30	
C x I	0.08	1	0.08	0.25
C x I x L	0.84	1	0.84	2.37
C x I x S	0.97	1	0.97	2.76
C x I x L x S	0.01	1	0.01	0.04
ERROR	52.78	149	0.35	
T x C x I	0.41	1	0.41	1.23
T x C x I x L	0.21	1	0.21	0.64

T x C x I x S	0.14	1	0.14	0.45
T x C x I x L x S	0.58	1	0.58	1.74
ERROR	49.66	149	0.33	
Emotion(E)	103.91	3	34.63	47.54**
E x L	5.06	3	1.68	2.32
E x S	0.97	3	0.32	0.45
E x L x S	2.15	3	0.71	0.99
ERROR	325.69	447	0.72	
T x E	51.81	3	17.27	36.06**
T x E x L	1.64	3	0.54	1.14
T x E x S	0.94	3	0.31	0.66
T x E x L x S	1.53	3	0.51	1.07
ERROR	214.05	447	0.47	
C x E	140.29	3	46.76	104.44**
C x E x L	2.08	3	0.69	1.55
C x E x S	1.79	3	0.59	1.34
C x E x L x S	3.06	3	1.02	2.28
ERROR	200.15	447	0.44	
T x C x E	45.65	3	15.21	33.71**
T x C x E x L	1.98	3	0.66	1.46
T x C x E x S	1.10	3	0.36	0.82
T x C x E x L x S	3.01	3	1.00	2.23
ERROR	201.77	447	0.45	
I x E	0.63	3	0.21	0.65
I x E x L	5.77	3	1.92	5.87*
I x E x S	0.59	3	0.19	0.61
I x E x L x S	1.00	3	0.33	1.02
ERROR	146.54	447	0.32	
T x I x E	0.77	3	0.25	0.73
T x I x E L	1.92	3	0.64	1.83
T x I x E x S	0.12	3	0.04	0.12
T x I x E x L x S	0.26	3	0.08	0.25
ERROR	156.98	447	0.35	
C x I x E	0.45	3	0.15	0.41
C x I x E x L	1.91	3	0.63	1.72
C x I x E x S	0.71	3	0.23	0.65
C x I x E x L x S	0.55	3	0.18	0.50
ERROR	165.38	447	0.36	
T x C x I x E	1.27	3	0.42	1.34
T x C x I x E x L	0.79	3	0.26	0.83
T x C x I x E x S	1.78	3	0.59	1.87
T x C x I x E x L x S	0.05	3	0.01	0.06
ERROR	142.29	447	0.31	

*P < .01 **P < .001

Appendix F

Repeated measures analysis of variance:
Intensity of Emotions Scores

TABLE 18

Mean Intensity Scores Given by Raters on Each Type of Stimulus

	RATERS				
	White-Collar Anglo-Phone n=35	Blue-Collar Anglo-Phone n=22	White-Collar Franco-Phone n=22	Blue-Collar Franco-Phone n=48	Marginal N=127
Stimulus Type*					
EWIA	8.02	7.77	7.63	7.83	7.84
EWIH	6.54	6.31	6.36	6.41	6.42
EWIL	6.57	6.31	6.27	6.81	6.56
EWIS	6.28	6.22	6.00	6.00	6.11
EWNA	7.77	8.00	7.68	7.72	7.77
EWNH	6.28	6.04	5.72	6.35	6.17
EWNL	6.22	5.90	6.31	6.54	6.30
EWNS	5.94	5.86	6.63	6.47	6.25
EBIA	7.74	7.59	6.59	7.31	7.35
EBIH	6.62	5.68	7.22	6.58	6.55
EBIL	6.28	6.27	5.27	5.85	5.94
EBIS	6.45	6.63	5.86	6.18	6.28
EBNA	7.48	8.13	6.68	7.22	7.36
EBNH	6.25	6.40	6.00	6.81	6.44
EBNL	5.88	5.72	5.59	5.66	5.72
EBNS	6.48	6.40	5.77	6.12	6.21
FWIA	6.17	5.81	5.50	5.87	5.88
FWIH	6.31	5.45	5.68	6.45	6.11
FWIL	5.97	5.50	5.77	5.56	5.70
FWIS	5.60	5.54	5.90	5.14	5.47
FWNA	6.02	6.09	5.40	6.12	5.96
FWNH	6.05	5.50	5.95	6.31	6.03
FWNL	5.08	4.63	4.86	5.27	5.03
FWNS	5.42	5.31	5.27	5.56	5.43
FBIA	5.31	5.77	5.50	5.12	5.35
FBIH	5.68	5.90	5.86	5.97	5.86
FBIL	5.80	6.77	5.86	5.81	5.98
FBIS	6.28	6.68	6.27	6.02	6.25
FBNA	5.00	5.09	4.86	5.14	5.04
FBNH	5.77	5.81	5.45	5.29	5.54
FBNL	5.62	6.81	5.45	5.60	5.79
FBNS	6.11	5.90	6.09	5.70	5.92
Marginal	6.22	6.18	5.98	6.15	6.14

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
I = Identified, N = Nonidentified,
A = Anger, H = Happiness, L = Love, S = Sadness

TABLE 19

Standard Deviations on Intensity Scores

Stimulus Type*	RATERS: White-Collar Anglo-Phone n=35	Blue-Collar Anglo-Phone n=22	White-Collar Franco-Phone n=22	Blue-Collar Franco-Phone n=48
EWIA	1.27	1.63	1.78	1.49
EWIH	1.31	1.86	1.43	1.72
EWIL	1.57	1.55	2.25	1.81
EWIS	1.36	2.06	1.74	2.08
EWNA	1.11	1.30	1.58	1.23
EWNH	1.87	1.58	1.69	1.76
EWNL	1.19	1.60	1.52	1.74
EWNS	1.67	1.67	1.64	1.44
EBIA	1.50	1.68	1.68	1.20
EBIH	1.84	1.78	1.63	1.74
EBIL	1.82	2.09	1.69	1.58
EBIS	1.83	2.30	1.69	2.25
EBNA	1.48	1.64	1.83	1.47
EBNH	1.85	1.81	2.16	1.65
EBNL	1.49	1.69	2.10	1.71
EBNS	1.93	1.84	2.04	1.73
FWIA	1.70	1.91	1.92	1.46
FWIH	1.40	1.84	1.72	1.95
FWIL	1.94	1.62	1.79	1.48
FWIS	1.37	1.87	1.90	1.66
FWNA	1.74	1.82	1.76	1.61
FWNH	1.58	1.71	1.36	1.74
FWNL	1.42	1.67	1.48	1.65
FWNS	1.71	2.00	1.72	1.73
FBIA	1.67	1.82	1.47	1.17
FBIH	1.65	2.11	1.83	1.65
FBIL	1.58	1.60	1.95	1.59
FBIS	1.40	2.12	2.22	1.73
FBNA	1.57	1.94	1.12	1.45
FBNH	1.83	1.86	1.76	1.74
FBNL	1.62	1.43	1.68	1.64
FBNS	1.84	1.71	1.99	1.79

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
I = Identified, N = Nonidentified,
A = Anger, H = Happiness, L = Love, S = Sadness

TABLE 20

Summary table

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
Rater Language(L)	17.23	1	17.23	0.64
Rater Status(S)	4.28	1	4.28	0.16
L x S	10.18	1	10.18	0.38
ERROR	3288.41	123	26.73	
Speaker Language(T)	653.21	1	653.21	238.34**
T x L	0.04	1	0.04	0.02
T x S	0.26	1	0.26	0.10
T x L x S	5.51	1	5.51	2.01
ERROR	337.11	123	2.74	
Speaker Status(C)	1.77	1	1.77	0.65
C x L	24.50	1	24.50	8.93*
C x S	6.54	1	6.54	2.38
C x L x S	14.93	1	14.93	5.44
ERROR	337.42	123	2.74	
T x C	19.17	1	19.17	6.18
T x C x L	0.52	1	0.52	0.17
T x C x S	0.35	1	0.35	0.11
T x C x L x S	18.01	1	18.01	5.80
ERROR	381.78	123	3.10	
Identified/ Nonidentified(I)	30.27	1	30.27	8.81*
I x L	0.87	1	0.87	0.25
I x S	4.38	1	4.38	1.27
I x L x S	0.29	1	0.29	0.09
ERROR	422.80	123	3.43	
T x I	5.26	1	5.26	3.19
T x I x L	0.37	1	0.37	0.23
T x I x S	0.15	1	0.15	0.10
T x I x L x S	2.59	1	2.59	1.57
ERROR	203.17	123	1.65	
C x I	0.29	1	0.29	0.17
C x I x L	4.53	1	4.53	2.65
C x I x S	0.13	1	0.13	0.08
C x I x L x S	0.00	1	0.00	0.01
ERROR	210.13	123	1.70	
T x C x I	0.80	1	0.80	0.54
T x C x I x L	0.14	1	0.14	0.10

T x C x I x S	4.98	1	4.98	3.36
T x C x I x L x S	0.11	1	0.11	0.08
ERROR	182.51	123	1.48	
Emotion(E)	246.55	3	82.18	29.21**
E x L	24.83	3	8.27	2.94
E x S	9.95	3	3.31	1.18
E x L x S	11.06	3	3.68	1.31
ERROR	1038.10	369	2.81	
T x E	423.45	3	141.15	63.66**
T x E x L	5.71	3	1.90	0.86
T x E x S	3.16	3	1.05	0.48
T x E x L x S	5.74	3	1.91	0.86
ERROR	818.14	369	2.21	
C x E	99.17	3	33.05	14.71**
C x E x L	15.54	3	5.18	2.31
C x E x S	5.87	3	1.95	0.87
C x E x L x S	7.55	3	2.51	1.12
ERROR	829.12	369	2.24	
T x C x E	94.88	3	31.62	14.81**
T x C x E x L	23.32	3	7.77	3.64
T x C x E x S	11.58	3	3.86	1.81
T x C x E x L x S	1.55	3	0.51	0.24
ERROR	787.92	369	2.13	
I x E	9.53	3	3.17	1.63
I x E x L	11.75	3	3.91	2.00
I x E x S	4.99	3	1.66	0.85
I x E x L x S	2.76	3	0.92	0.47
ERROR	721.25	369	1.95	
T x I x E	4.44	3	1.48	1.03
T x I x E x L	4.11	3	1.37	0.95
T x I x E x S	16.23	3	5.41	3.76*
T x I x E x L x S	9.12	3	3.04	2.11
ERROR	531.41	369	1.44	
C x I x E	9.14	3	3.04	1.80
C x I x E x L	3.80	3	1.26	0.75
C x I x E x S	5.37	3	1.79	1.06
C x I x E x L x S	1.14	3	0.38	0.22
ERROR	624.26	369	1.69	
T x C x I x E	9.86	3	3.28	2.00
T x C x I x E x L	6.21	3	2.07	1.26
T x C x I x E x S	2.91	3	0.97	0.59
T x C x I x E x L x S	3.60	3	1.20	0.73
ERROR	606.23	369	1.64	

*P < .01 **P < .001

Appendix G

Repeated measures analysis of variance: Errors on the valence dimension

TABLE 21

Mean number of positive and negative errors made on each type of stimulus by group of rater

	RATERS				
	White-Collar Anglo-Phone n=46	Blue-Collar Anglo-Phone n=24	White-Collar Franco-Phone n=30	Blue-Collar Franco-Phone n=53	Marginal N=153
Stimulus Type*					
EWPP	0.35	0.29	0.53	0.53	0.44
EWPN	4.37	4.88	4.70	4.74	4.64
EWNP	1.96	2.21	2.60	2.51	2.31
EWNN	1.30	1.58	1.27	1.21	1.31
EBPP	0.22	0.33	0.83	0.62	0.50
EBPN	4.78	4.63	4.27	4.81	4.67
EBNP	1.33	1.46	1.70	1.79	1.58
EBNN	1.54	1.38	1.60	1.11	1.38
FWPP	1.78	1.79	2.10	2.02	1.93
FWPN	2.87	3.67	3.20	2.72	3.01
FWNP	3.93	3.67	4.20	3.98	3.96
FWNN	1.39	1.63	1.40	1.23	1.37
FBPP	1.98	2.04	2.33	2.42	2.21
FBPN	3.70	4.00	3.53	3.72	3.72
FBNP	2.70	3.46	3.20	2.72	2.92
FBNN	1.93	1.58	1.37	1.57	1.64
Marginal	2.26	2.41	2.43	2.35	2.35

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
P (in third column) = Positive Stimulus,
N (in third column) = Negative Stimulus,
P (in fourth column) = Positive Error,
N (in fourth column) = Negative Error

TABLE 22

Standard deviations on positive and negative errors

	RATERS			
Stimulus Type*	White-Collar Anglo-Phone n=46	Blue-Collar Anglo-Phone n=24	White-Collar Franco-Phone n=30	Blue-Collar Franco-Phone n=53
EWPP	0.53	0.55	0.90	0.70
EWPN	1.74	1.73	1.62	1.48
EWNP	1.11	1.56	1.48	1.55
EWNN	0.94	1.32	0.98	1.06
EBPP	0.47	0.64	0.79	0.74
EBPN	1.53	1.56	1.31	1.58
EBNP	1.16	1.32	1.21	1.32
EBNN	1.13	1.13	1.19	1.01
FWPP	1.26	1.18	1.03	1.23
FWPN	1.83	1.43	1.06	1.62
FWNP	1.53	1.55	1.63	1.54
FWNN	1.00	1.13	0.93	1.01
FBPP	1.29	1.04	1.32	1.35
FBPN	1.67	1.29	1.53	1.76
FBNP	1.35	1.44	1.45	1.43
FBNN	1.20	1.06	1.03	1.39

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
A (in third column) = Active Stimulus,
P (in third column) = Passive Stimulus,
A (in fourth column) = Active Error,
P (in fourth column) = Passive Error

TABLE 23

Summary table

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
Rater Language(L)	1.74	1	1.74	1.48
Rater Status(S)	0.91	1	0.91	0.77
L x S	7.03	1	7.03	5.95
ERROR	176.17	149	1.18	
Speaker Language(T)	145.21	1	145.21	118.92**
T x L	3.78	1	3.78	3.10
T x S	0.01	1	0.01	0.01
T x S	1.12	1	1.12	0.92
ERROR	181.95	149	1.22	
Speaker Status(C)	2.06	1	2.06	2.28
C x L	0.28	1	0.28	0.31
C x S	0.00	1	0.00	0.00
C x L x S	2.26	1	2.26	2.51
ERROR	134.79	149	0.90	
T x C	5.82	1	5.82	6.16*
T x C x L	0.18	1	0.18	0.20
T x C x S	2.04	1	2.04	2.17
T x C x L x S	0.01	1	0.01	0.02
ERROR	140.74	149	0.94	
Stimulus type: Positive or Negative(K)	179.91	1	179.91	132.61**
K x L	0.53	1	0.53	0.40
K x S	2.15	1	2.15	1.59
K x L x S	0.17	1	0.17	0.13
ERROR	202.15	149	1.35	
T x K	58.64	1	58.64	57.38**
T x K x L	0.25	1	0.25	0.25
T x K x S	0.06	1	0.06	0.07
T x K x L x S	1.08	1	1.08	1.06
ERROR	152.28	149	1.02	
C x K	46.85	1	46.85	40.64**
C x K x L	1.00	1	1.00	0.87
C x K x S	0.11	1	0.11	0.10
C x K x L x S	2.33	1	2.33	2.02
ERROR	171.80	149	1.15	
T x C x K	7.13	1	7.13	7.54*
T x C x K x L	1.02	1	1.02	1.09
T x C x K x S	0.33	1	0.33	0.35

T x C x K x L x S	0.69	1	0.69	0.73
ERROR	140.98	149	0.94	
Error type				
Positive or Negative(E)	313.43	1	313.43	99.34**
E x L	29.54	1	29.54	9.36
E x S	0.66	1	0.66	0.21
E x L x S	0.03	1	0.03	0.01
ERROR	470.10	149	3.15	
T x E	614.81	1	614.81	284.94**
T x E x L	0.00	1	0.00	0.00
T x E x S	0.18	1	0.18	0.08
T x E x L x S	0.02	1	0.02	0.01
ERROR	321.49	149	2.15	
C x E	40.95	1	40.95	17.56**
C x E x L	0.00	1	0.00	0.00
C x E x S	2.34	1	2.34	1.00
C x E x L x S	11.29	1	11.29	4.84
ERROR	347.63	149	2.33	
T x C x E	5.43	1	5.43	2.62
T x C x E x L	0.74	1	0.74	0.36
T x C x E x S	0.00	1	0.00	0.00
T x C x E x L x S	2.24	1	2.24	1.08
ERROR	308.62	149	2.07	
K x E	2264.04	1	2264.04	900.74**
K x E x L	0.02	1	0.02	0.01
K x E x S	3.43	1	3.43	1.37
K x E x L x S	1.92	1	1.92	0.77
ERROR	374.51	149	2.51	
T x K x E	69.25	1	69.25	35.78**
T x K x E x L	1.80	1	1.80	0.93
T x K x E x S	0.90	1	0.90	0.47
T x K x E x L x S	6.44	1	6.44	3.33
ERROR	288.43	149	1.93	
C x K x E	25.51	1	25.51	12.69**
C x K x E x L	2.33	1	2.33	1.16
C x K x E x S	1.66	1	1.66	0.83
C x K x E x L x S	0.21	1	0.21	0.11
ERROR	299.60	149	2.01	
T x C x K x E	0.23	1	0.23	0.12
T x C x K x E x L	0.36	1	0.36	0.18
T x C x K x E x S	0.00	1	0.00	0.00
T x E x L x S	4.97	1	4.97	2.53
ERROR	292.87	149	1.96	

*P < .01 **P < .001

Appendix H

Repeated Measures Analysis of Variance: Errors on the Active/Passive Dimension

TABLE 24

Mean number of active and passive errors made on each type of stimulus by group of rater

	RATERS				
	White-Collar Anglo-Phone n=46	Blue-Collar Anglo-Phone n=24	White-Collar Franco-Phone n=30	Blue-Collar Franco-Phone n=53	Marginal N=153
Stimulus Type*					
EWAA	2.84	3.41	3.26	3.39	3.20
EWAP	0.45	0.37	0.60	0.60	0.52
EWPA	1.32	1.41	1.96	1.75	1.61
EWPP	3.34	3.75	3.26	3.22	3.35
EBAA	3.23	3.37	3.23	3.30	3.28
EBAP	0.47	0.62	0.56	0.58	0.55
EBPA	0.97	0.91	1.80	1.79	1.41
EBPP	3.17	2.87	2.80	2.66	2.87
FWAA	2.43	2.66	2.36	2.15	2.35
FWAP	1.71	2.00	1.86	1.84	1.83
FWPA	4.34	4.50	4.93	4.69	4.60
FWPP	1.47	1.58	1.73	1.24	1.46
FBAA	1.86	1.95	2.16	1.39	1.77
FBAP	4.52	5.00	4.16	4.45	4.50
FBPA	1.08	1.29	1.76	2.01	1.57
FBPP	2.82	2.83	2.33	2.54	2.63
Marginal	2.25	2.41	2.42	2.35	2.34

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
A (in third column) = Active Stimulus,
P (in third column) = Passive Stimulus,
A (in fourth column) = Active Error,
P (in fourth column) = Passive Error

TABLE 25

Standard Deviations on Active and Passive Errors

	RATERS			
Stimulus Type*	White-Collar Anglo-Phone n=46	Blue-Collar Anglo-Phone n=24	White-Collar Franco-Phone n=30	Blue-Collar Franco-Phone n=53
EWAA	1.49	1.50	1.59	1.39
EWAP	0.65	0.64	0.96	0.74
EWPA	1.23	1.44	1.69	1.61
EWPP	1.30	1.56	1.52	1.25
EBAA	1.19	1.58	1.00	1.26
EBAP	0.91	1.01	0.89	0.79
EBPA	1.08	1.24	1.24	1.43
EBPP	1.49	1.56	1.60	1.19
FWAA	1.36	1.73	1.40	1.26
FWAP	1.16	1.35	1.25	1.16
FWPA	1.99	1.97	1.74	1.58
FWPP	1.42	1.28	1.38	1.03
FBAA	1.12	1.12	0.98	1.00
FBAP	1.11	0.93	1.14	1.42
FBPA	1.22	1.75	1.45	1.65
FBPP	1.33	1.43	1.42	1.44

*E = English, F = French,
W = White-Collar, B = Blue-Collar,
A (in third column) = Active Stimulus,
P (in third column) = Passive Stimulus,
A (in fourth column) = Active Error,
P (in fourth column) = Passive Error

TABLE 26

Summary Table

SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
Rater Language(L)	1.74	1	1.71	1.48
Rater Status(S)	0.91	1	0.98	0.77
L x S	7.03	1	7.01	5.95
ERROR	176.17	149	1.17	
Speaker Language(T)	145.21	1	145.24	118.92**
T x L	3.78	1	3.78	3.10
T x S	0.01	1	0.09	0.01
T x L x S	1.12	1	1.11	0.92
ERROR	181.95	149	1.25	
Speaker Status(C)	2.06	1	2.03	2.28
C x L	0.28	1	0.28	0.31
C x S	0.00	1	0.07	0.00
C x L x S	2.26	1	2.21	2.51
ERROR	134.79	149	0.90	
T x C	5.82	1	5.85	6.16
T x C x L	0.18	1	0.17	0.20
T x C x S	2.04	1	2.09	2.17
T x C x L x S	0.01	1	0.07	0.02
ERROR	140.74	149	0.93	
Stimulus type: Active or Passive(K)	15.32	1	15.32	10.30*
K x L	7.90	1	7.92	5.31
K x S	1.07	1	1.07	0.72
K x L x S	0.64	1	0.65	0.43
ERROR	221.76	149	1.43	
T x K	34.99	1	34.95	41.32**
T x K x L	2.95	1	2.93	3.49
T x K x S	0.66	1	0.60	0.78
T x K x L x S	0.60	1	0.67	0.71
ERROR	126.19	149	0.83	
C x K	211.84	1	211.82	285.24**
C x K x L	2.26	1	2.29	3.05
C x K x S	0.38	1	0.33	0.52
C x K x L x S	2.95	1	2.99	3.98
ERROR	110.65	149	0.78	
T x C x K	88.51	1	88.56	92.88**
T x C x K x L	0.57	1	0.50	0.60

T x C x K x S	1.82	1	1.85	1.92
T x C x K x L x S	0.29	1	0.21	0.31
ERROR	141.99	149	0.91	
Error type:				
Active or Passive(E)	35.79	1	35.73	9.05*
E x L	25.55	1	25.50	6.46*
E x S	0.11	1	0.15	0.03
E x L x S	0.77	1	0.71	0.20
ERROR	589.20	149	3.99	
T x E	45.15	1	45.16	21.79**
T x E x L	0.23	1	0.22	0.11
T x E x S	1.87	1	1.89	0.90
T x E x L x S	0.06	1	0.08	0.03
ERROR	308.72	149	2.07	
C x E	443.56	1	443.58	240.73**
C x E x L	5.15	1	5.10	2.80
C x E x S	0.70	1	0.74	0.38
C x E x L x S	0.15	1	0.15	0.09
ERROR	274.54	149	1.89	
T x C x E	514.80	1	514.86	227.76**
T x C x E x L	2.13	1	2.17	0.95
T x C x E x S	1.02	1	1.01	0.45
T x C x E x L x S	0.81	1	0.80	0.36
ERROR	336.78	149	2.20	
K x E	181.19	1	181.10	63.54**
K x E x L	26.24	1	26.27	9.20
K x E x S	0.91	1	0.95	0.32
K x E x L x S	0.99	1	0.92	0.35
ERROR	424.87	149	2.83	
T x K x E	1437.38	1	1437.35	622.23**
T x K x E x L	0.51	1	0.58	0.22
T x K x E x S	5.39	1	5.39	2.34
T x K x E x L x S	0.07	1	0.07	0.03
ERROR	344.20	149	2.37	
C x K x E	4.16	1	4.16	1.74
C x K x E x L	0.49	1	0.47	0.21
C x K x E x S	4.00	1	4.05	1.67
C x K x E x L x S	0.24	1	0.26	0.10
ERROR	356.96	149	2.35	
T x C x K x E	13.41	1	13.40	6.22*
T x C x K x E x L	0.30	1	0.38	0.14
T x C x K x E x S	0.11	1	0.13	0.05
T x C x K x E x L x S	0.52	1	0.57	0.24
ERROR	321.50	149	2.16	

*P < .01 **P < .001

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