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THE AUDITORY PERCEPTION OF AFFECT:
AN INTERACTIONAL APPROACH TO THE
PHENOMENON OF QUALITATIVE CHANGE

by

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ABSTRACT

In this thesis affect or emotion has been assumed to be a mental process, like cognition of 'thinking', but without a clear semantic or verbal mode of expression. Again like cognition, emotion was assumed to function predicated on the biological activity of the nervous system, in some relation complimentary to cognition, yet in some manner a distinct phenomenon also. It was hypothesized that local flux or qualitative shift occurred in the flow of speech as a function of the natural ongoingness of emotional processing. That these shifts should be apparent to naive or untrained observers was the specific question asked. Such shifts were identified as function of their location at a level of interobserver agreement considerably beyond that which might be expected by chance.

A comparison study was done following the completion of the analysis of shifts. This study used the support code taken from the Interactional Process Coding Scheme, a microanalytic multivariable investigation of marital and family interaction patterns. Major changes (support vs. nonsupport) in IPSC codes were compared with the shifts identified by consensus of observers in the major test of this thesis. Agreement between the two codes was found to be in excess of expectations generated by chance alone. Thus, the conclusion was supported that both groups of coders were engaged in the same activity, the measurement of affect.

The results of this thesis support the hypothesis that shift in affective expression occurs as an objective, reliably measured phenomenon. With the establishment of the location of affective shifts the outline of affective sequencing becomes available for further evaluation.

LITERATURE REVIEW

There are two problems encountered in an attempt to do research in the field of emotion. The first is the need to organize the data from the far-flung yet relevant literatures in a systematic and manageable manner. The second problem is the development of appropriate assessment procedures. While neither of these problems is unique to the study of emotion, they are particularly characteristic of this field.

The task of organizing information from this literature is something of an adventure. The discovery of an out of the way reference to an interesting source can be exciting, the dawning awareness of the vast sprawl that typifies the field can be bewildering, and the realization of the impossibility of synthesis can be frustrating. Ample warning is given with the recognition that after 100 years of investigation there exists nothing approaching a consensus as to the relevant parameters of the phenomenon. Mandler (1975) is straightforward in presenting the view that the question of a precise definition of emotion remains as unapproachable today as when it was first asked (in modern times) by James (1884). Insofar as the stating of a problem for further study implies the existence of implicit if not explicit 'theory', this view can be criticized for confusing the substance of theory with the necessity of its use in even tentative model-building.

Among the many attempts at organizing the data are two that are noteworthy by reason of their inclusiveness. Riviera (1977) attempts to make sense of the array of theories by suggesting that there are three categories which subsume the field. He proposes that these categories are theory based on: evolutionary/instinctual aspects of motivation, appraisal of the environment or the perception of value, and the transformation of the relations between the psychological self and the environment. Eysenck (1975) organizes the field in a similar tripartite system where the categories are: physiological concomitants of emotion, introspection or verbal assessment, and behavioral observation and assessment. Riviera and Eysenck each represent distinctly different approaches to the issues of emotional investigation in that the former

focuses attention on the organization of the conceptual variables while the latter attends to the issues of available methodology. The result is one where each may be assumed to have circumscribed the same phenomenon (they are each still asking the same question, 'what is emotion?' albeit in different form) without any mutuality of language. The lack of interface between the phenomenon conceptually and methodologically apparent here is also a continuing critical problem in the field as a whole. This difficulty can be seen to act as a decision procedure forcing one to pursue as one's primary goal conceptual synthesis or the establishment of systematic measurement procedures, but seldom both at the same time.

As early as 1895 Dewey predicted a fundamental complexity that would preclude indefinitely a unified theory of emotion. Alechsieff (1907) described emotion as a 'nonlocalizable, nonobjective, . . . nondescribable' phenomenon. Watson (1919), who conceptualized emotion as 'pattern-reaction', acknowledged an inability to differentiate emotions from non-emotional behavior from observation of behavior alone, excepting perhaps in early infancy. Brady (1975) makes a similar point in his observation that there is so much going on in the 'head' that is nonoperational and that when one attempts to make it operational, one is immediately outside in the environment.

Introspective accounts of emotion were vigorously explored in a great and long debate that arose around the turn of the century. There were two main protagonists, the famous Wundt in Germany and his former student Titchener at Cornell. At the center of this debate was Wundt's Tridimensional Theory. In it Wundt argued for the appropriateness of three dimensions to adequately cover the observed variability of emotion (pleasantness-unpleasantness, excitement-depression, strain-relaxation) while Titchener acknowledged the legitimacy of only one (pleasantness-unpleasantness). The value of a review of this particular literature issues from an exploration of the reasons for its inability to develop a generative data base. Very clearly this was an inability to

complement reasonable conceptual schemes with sufficient rigorous assessment procedures. Writing in the Psychology of Pleasantness and Unpleasantness Beebe-Center (1932) states, "The preceding review of theories with its wholly negative conclusion indicates some fundamental weaknesses in current theorizing about hedonic tone [affectively] . . . in seeking to cover all possible facts such theories . . . have lost contact with [those] facts together . . . theorizing . . . has turned into mere speculation." Among the more interesting speculations is one from Leventhal (1979) who suggests that emotional communication, expression and perception, can be organized into a coherent whole only on a systemic level. He offers a notion of a 'hierarchy of parallel, partially independent and interacting mechanisms' to account for the complexity of emotional variables.

Shrykov (1977) expands this notion to the relation of psychological to physiological processes by suggesting that psychological behavior as a qualitatively specific form of a whole organisms adaptation to the environment rests on the existence of systemic mechanisms capable of organizing the individual processes into an integral whole. This field of research concerned with the relations between emotion and various physiological changes was given impetus by the James-Lange theory (James 1884, Lang, 1885) during this same turn of the century period. The field has been continuously researched with an increasing interest into the present, yet without a consistency of results (Cannon, 1927 & 1931, Cehacter & Singer, 1962, Altman, 1978, Lader, 1975, Abraham, 1976, Tucker, 1977). The problem here with the psychophysiological investigations of emotion is just the reverse of the difficulties with the previously mentioned tradition. Where Wundt and others failed 'ground' theory with procedure that allowed for replication, the precise methodological procedures of psychophysiological research does not yield easily of coherent theory.

Davitz (1964, 1969) and Scherer (1974, 1977) provide very interesting and potentially complimentary areas of investigation into emotion. Just as Davitz admits

in the Language of Emotion that his earlier work would have been better titled the Communication of Emotional Labels, so, too, the title of the latter text could be better phrased Language and Emotion. Nonetheless, Davitz establishes support for emotion as a communicational variable at the social level, a 'social phenomenology' as he refers to it (1969). He raises necessary questions about the various issues and approaches to emotion. In particular, of course, is the relation of language to emotion. This introduces the 'existential' perspective on the uniqueness of individual experience and its manifestation in (as) the common linguistic (cognitive) milieu. So the issue of empiricism versus phenomenology is raised again.

Scherer on the other hand reviews (In Izard, 1979) research addressing the nonlinguistic vocal indicators of emotion, an area in which he has been a major contributor. He notes that this area of research is marked by promising leads, but also few sound empirical studies focused on emotion directly. Of particular interest is the literature on the vocal indicators of discreet emotions. Scherer entertains the question of whether or not . . . 'there are sets or patterns of vocal cues comparable to facial displays that characterize discreet primary emotions. Allowing the inclusion of the term 'primary' to stand unchallenged, this question is to a degree addressed to the same concerns as is this thesis.

A total of 16 studies reviewed by Scherer produced evidence for the dimension of pitch, loudness and tempo as reliable indicators of anger and depression/sadness. It is noted that 13 of these studies used actors or simulations for emotions, raising the question of genuineness. As with Davitz's work where particular words may be seen to reliably designate a particular class of emotion, it is not clear where emotion begins and its vehicle of expression leaves off.

Probably the most rigorous and constructive line of research in emotion is the work descending directly from Darwin (1872) on the facial expression of emotion. This tradition is well known and includes most notably the work of Ekman (1972, 1973, 1980), Tomkins (1962) and Izard (1977, 1979) among others.

This line of research has demonstrated support for the notion of 'universal' patterns of facial musculature posturing predicated in part on human genetic history and influenced by social and cultural peculiarities. As such, under conditions of relative sociocultural neutrality, facial expressions can be expected to provide consistent referents for recognition of various emotional states across populations.

Among the interesting facets of this research is the clear understanding that facial expressions are not static postures but integrated movements - quick, subtle and continuous (Birdwhistell, 1970). Most important is the successful wedding of empiricism and phenomenology as evident in the focus of analysis on natural events, the physical parameters of specific behaviors and not abstracted conceptualizations of purported events. This appears as a major advance in the history of investigations in emotion.

Emotion as a strictly verbal/vocal phenomenon does not enjoy the advantage of easily identifiable and fixed referents. An auditory referent does not exist in the sense of a 'figure' (smile) that may be reliably differentiated from its 'ground' (face) by pointing at it (literally or literatively). The work of Davitz may be seen as an attempt to fill this breach with the substitution of labels. This attempt is successful only on a macro-scale, as labels are, of course, terms appropriate to classes of behavior and as such are not analogous to the use of the physical parameters of a behavior as an operational variable.

Scherer comes closest to providing specific auditory referents to emotions of any investigator whose primary research focus is on emotion. Yet, Scherer qualifies his own work and repeatedly discounts the overall credibility of the field in general.

There is another field of research that has, as an auxiliary focus, an interest in emotion as an issue in auditory perception. This is the field of marital and family studies based on an interactional approach. The field is large and includes a number of relatively independent traditions. Of particular interest here is one line of research

that encompasses the work of a half-dozen or so investigators who have used a research design calling for the audio tape recording of a specified interaction sequence. This recording becomes, with a typed transcript, the primary data source and is then coded by trained observers using multi-dimensional assessment procedures. Those investigators with an interest in the assessment of emotion, usually termed 'affect' in these studies, have incurred a particularly trying challenge.

Among the first of these investigators was Bales (1951) who developed a 12 category coding procedure, the Interactional Process Analysis (IPA). The IPA has served as a reference for many investigative efforts that have followed to date.

In the IPA the entire transcript is apportioned into acts or units of behavior whose boundaries are defined by rule. Each act is then evaluated by trained coders in terms of the categories of assessment. Expressiveness, in some part analogous to emotional manifestation, is one such category. Expressiveness in the IPA is defined by characterization as follows:

- | | |
|------------------------|-------------------------------|
| Positive Affect | 1) Shows solidarity (+++) |
| | 2) Shows tension release (++) |
| | 3) Shows agreement (+) |
| Negative Affect | 4) Shows disagreement (-) |
| | 5) Shows tension (—) |
| | 6) Shows antagonism (—) |

Terms 3 and 4, 'shows agreement' and 'shows disagreement', shared the greatest similarity while numbers 1 and 6, 'shows solidarity' and 'shows antagonism', were polar opposites and hence, the most loaded codes available. The object of reference was a specific relationship (marital or family) with an other. The quality of the relation was assumed to be analogous to the ascertained degree of orientation to

or away from/against (shows solidarity or shows antagonism) the relation in question. This assumption was central to Bales' concept of emotion as measured by the IPA. The major discrimination is in effect one on a positive-negative dimension.

Mishler and Waxler (1968) developed a modification of the IPA in their research that included an affect scale. A major change was the inclusion of a midpoint (4 on a 7 point scale) neutral affect code. The most significant difference in their coding procedure involved the decision to use only the typed transcript as the data source for the affect coders. Affect was judged solely as a function of the semantic meaning of the words used. No attention was paid to the tone of voice.

This affect scale, again defined in large part by characterization, was as follows:

- | | |
|------------------------|-----------------------------------|
| Positive Affect | 1) moving towards (+++) |
| | 2) positive states of people (++) |
| | 3) positive qualities (+) |
| | 4) neutral affect (0) |
| | 5) negative qualities (-) |
| | 6) negative states of people (—) |
| Negative Affect | 7) moving away or against (—) |

This kind of scaling has continued to serve as the prototype for affect scales in the literature to date (Gottman, 1979; Bell et al, 1982). Judgments about affect or emotion in terms of positive and negative are call backs to Wundt's time and the debate on the pleasantness-unpleasantness continuum. In fact the earliest such 7-point positive-pleasant/negative-unpleasant scale found in the literature is dated 1895 (D.R. Major).

Direct investigations seeking after more appropriate parameters of emotion and the use of affect scales in large multivariable projects do not completely overlap nor

should they be expected to do so. However, it does stand to reason if affect/emotion can be reliably assessed in terms of a positive/negative dimension across these several studies (correlations range from .70 to the .90's), then it can be viewed as lending empirical support for that aspect of the Tridimensional theory. This potential support must be tempered in that the various affect scales are each elaborations on a common theme only. The specific instructions to the coders vary considerably, involving in some combination, a focus on: tone of voice, content of words, some aspects of hypothesized relationships, and the metaphor of movement to or against, among others. The question remains, to paraphrase James, "just what is it that affect coders assess?".

To continue chasing after James' celebrated question is a course to be avoided. Descriptions of emotion or affect abound in various literatures. Yet, it may well prove that emotion will not yield to semantic description of any but the most general kind.

Holding that the phenomenon of affective display and perception are dynamic, process variables available to natural observation provides the necessary theory for an alternative approach to the question of emotional assessment.

STATEMENT OF THE PROBLEM

The necessary assumptions that allow for this study are three in number. The first requires that:

- 1) Emotion exists in some meaningful way.

The history of investigation and research cited above documents support for this assertion. The second assumption requires that:

- 2) Emotion is available to an observer as communication predicated on an auditory and/or visual perceptual experience.

As the first assumption requires only the existence of emotion in an unspecified domain, the second assumption addresses the domain of reference and specifies that it contain an observer who is separate or distinct from the phenomenon itself. That is, one who does not self-observe. This yields emotion as communication. From the perspective of the observer communication is a function of perceptual organization mediated by (primarily) audio or visual sensory perturbation. This assertion is supported by the literature, particularly the work of Ekman as noted above (see also Mehrabin, 1972, for a breakdown of emotional communication by channel, face, vocal, and body). The differentiation of public from private events is not an issue here.

The third assumption requires that:

- 3) Emotion is recognizable to an observer as a function of an underlying commonality of experience and existence.

This assertion acknowledges that for emotions to exist as communication available to an observer is insufficient in and of itself. The observer must be able to reliably attribute a measure of evaluation to his experience. Of the two substrates offered to account for this assertion, the first, the commonality of experience addresses specifically the commonality of language use (Davitz) and, generally, elements of individual history that can be seen as members of a class of elements likely to be representative of all individuals in any particular community (Berger and Luckman, 1967).

By commonality of existence reference is made to the common biological heritage of humans with a regard to the evolution of the nervous system, and particularly of neurological organization (Maturana, 1978).

These assumptions allow for the construction of a working definition of emotion:

Emotion is a mental process operating in an as yet incompletely specified domain of operations as a function of the common biological (neurological) heritage of human beings, and, as a component process, functions in the

establishment of the common cognitive or communicative (verbal, vocal, and behavioral) environment.

The question with which this thesis concerns itself is the following:

Given the above mechanistic and functional description of emotion and in light of the success of analysis of emotion as a visual perceptual problem, how is it that a natural (untrained) observer may auditorily notate his perception of emotion in others? Specifically I wish to test the assumption that relative change in the quality of emotion expressed is the factor that will yield to accounts of auditory perception. The problem is one of attempting to obtain the phenomenon by way of locating the change or transition points indicative of a qualitative shift in the quality of emotion in the speech of others. To restate the question in the form of my hypothesis:

Naive subjects will be able to reliably differentiate shifts in emotion as measured by the tendency to agree as to the location of such shifts in the speech of others.

METHODS

The testing situation involves a series of twelve experimental subjects listening in isolation to an audio recorded (in stereo) segment of a marital couple engaged in a forced conflict or 'revealed differences' task (Strodbeck, 1951). The segment contains a single woman's voice arranged in 43 sections. Each section is a speech containing one or more sentences or sentence fragments expressing that individual's statement or question and/or response to the statement or question from their mate. Each section is separated from the ones preceeding and following by a 5-second lag of blank tape. The boundaries of a section were established by excising the mate's voice, including portions of the dialogue where overlapping occurred. The segment otherwise preserves the natural sequence and content found on the master tape of the dialogue.

The stimulus was then one-half of a verbal interaction recorded on audio tape. There was no video recording or other information available in the testing situation. The master tape was selected from the data base of a large study on marital and family interaction conducted at the University of Houston at Clear Lake City under the direction of Linda Bell, PhD. The tape used was selected based on the single criteria that it contained a relatively small amount of 'overlapping speech'.

Subjects were recruited by a general appeal presented to a large undergraduate psychology class and two graduate psychology classes. This resulted in 22 potential subjects being recruited. Of the 22 positive responses, 4 dropped out without notice before their testing date. Of the remaining 18, six were used in trials aimed at establishing reliable procedures. This left the 12 subjects that were used as the experimental subjects.

A typewritten transcript of the semgnet was made to follow the sequence of the sections on the tape. Subjects were interviewed separately obtaining demographic information and imparting instructions specifying task behavior (see below, Instructions to Subjects), in particular, to listen to the tape with closed eyes. Affect was not defined but was described in terms of assumptions 1 (that affect exists in some meaningful form) and 3 (that affect is recognizable as a function of some underlying communality of experience), as well as a phenomenon that contained differences in quality. The subjects were oriented to the tape machine and a demonstration of competence requested. The specific task behavior presented to the subjects was to follow the tape auditorily with eyes closed and one hand positioned on the machine's pause button, stopping the tape when an affective change was perceived, then opening their eyes and marking that point as closely as possible on the transcript before reclosing their eyes and continuing on to the next point. Following the completion of the task each subject was debriefed as to their perceptions of the task.

The complete transcript was apportioned into cells each containing 5 letters with the space between (typed) words considered as one 'letter'. Markers placed in the apparent space between typed letters that coincided with cell boundaries were always counted with the cell to the left of the boundary. This apportionment resulted in 672 cells. A 'marker', a penciled slash made orthogonal to the typed sentence, is defined as a single subject's choice of a cell as containing a transition point or 'event', which is defined as a change in affect quality. The 'value' of a cell is defined as the number of markers per cell. The hypothesis is then concerned with the distribution of cells as a function of their value.

RESULTS

As shown in Table 1 below, there were 582 markers made in 672 cells with a mean value of .87 markers per cell. The null hypothesis predicts that progressively higher valued cells will become increasingly rarer given that each trial is independent and has but one of two possible outcomes. Specifically, the null hypothesis predicts that the obtained distribution will be statistically inseparable from the appropriate Poisson distribution at $p = .05$ ($H_0 = \text{Poisson distributed}$).

The Poisson distribution assumed a Poisson process, and has wide use in business and industry as a quality and cost control measure (Olkin, et al, 1980). The rationale for the Poisson is the observed property of the 'statistical regularity of chance phenomenon' (Derman, 1973) found in noncontingent frequency distributions when the probability of occurrence of a discreet event is very small while the number of opportunities for it to occur is very large. This results in the distribution curve taking a predictable form given the average number of occurrences per unit (Lamda). Lamda (A) is the single Poisson parameter.

Additionally, the Poisson assumes a continuum of time or space (length, distance, etc.) that can be broken down into segments and the occurrence or nonoccurrence of events over this continuum. In this investigation space is the dimension used. The random variable is the actual number of occurrences (markers) per unit of space (cell).

The Poisson generated expected values for 'A' = .87. A 'goodness of fit' test clearly demonstrates that the observed frequency distribution is not Poisson distributed, $\chi^2=560.99$, $p=.001$, $df=5$ (See Table 1).

TABLE 1

Values for expected and observed distributions Poisson parameter and chi-square.

<u>N</u>	<u>Observed</u>	<u>A</u>	<u>PX (X)⁽¹⁾</u>	<u>Expected</u>	<u>X²</u>
0	466	.00	.4215	283.25	117.92
1	95	.1414	.3637	244.41	91.54
2	35	.1042	.1574	105.77	47.46
3	19	.0848	.0455	30.58	4.40
4	13	.0774	.0099	6.65	6.06
5	8	.0595	.0017	1.14	(2) 293.61
6	13	.1161	.0003	.18	
7	7	.0729	.0000	.00	
8	8	.0752	.0000	.00	
9-12	<u>8</u>	<u>.1146</u>	<u>.0000</u>	<u>.00</u>	<u> </u>
	672	.8667	1.000	671.98	560.99

(1) Probability values taken from Olkin et al, page 537.

(2) Figure condenses chi-square values for N = 5 - 12

TABLE 2

Condensed summary of values for expected and observed distributions.

Value	0	1	2	3	4	5	6	7	8	9-12
Observed	466	95	35	19	13	8	13	7	8	8
Expected	283	244	106	31	7	1	0	0	0	0

THE QUESTION OF VALIDITY

In an effort to explore the issue of validity, codings of affect shift were compared to the affect scoring from the Bell et al "Interactional Process Scoring Codes" (1982). Two trials of IPSC coding were compared with one another. Those individual units coded consistently across the two IPSC trials were selected as criterion units and were used to compare for agreement or disagreement with the coding for affective changes in quality. The two trials of IPSC are noted in columns A and B in Table 3.

The IPSC affect scale, termed "support scale", features three categories (30, 20, 10) for support, characterized as degrees of increasing warmth or acceptance, and three categories (50, 60, 70) of nonsupport, characterized as degrees of defensiveness or rejection. There is also a midpoint (40) neutral category. Additionally there are two subordinant codes available, termed "sad" (x1) and "anxious" (x2) that could be used as second digits in conjunction with the major support-nonsupport codes. For example, the coding of "30" would designate a mildly supportive unit while "50" would designate a mildly nonsupportive unit. A "52" would designate a nonsupportive plus anxious unit (50 - 2). Auxilliary codes (x1 and x2) were rarely used with support codes (30, 20, 10).

Instructions to the IPSC support scale coders stressed using the tone of voice as well as the content of words as sources for coding. The instructions also included the convention to "code support as you [the coder] perceive it". This last instruction appears to be a condensed phrasing of the explicit assumptions underlying the rationale for this thesis, inferring emotion as a communication predicated on a separate observer's perceptual organization of the stimulus event. There was no other information available to the IPSC coders, visual or otherwise, regarding the dialogues on the tapes.

As noted above, criterion units were established by the comparison of the two trials of IPSC coding to select those units that were coded consistently. Consistent coding was defined by two rules: 1) the use of the same valence codes (10 or 20 or 30 separately from 50 or 60 or 70) such that support or nonsupport was coded consistently, even if degrees of support or nonsupport were coded inconsistently, across the two trials; 2) the use of the second digit, sad or anxious codes (x1 or x2) such that the presence or absence (x0) of auxiliary codes was consistent across the two trials. Fluctuations between the positive and negative valence codes and/or between the presence or absence of auxiliary codes are termed major changes in the IPSC coding.

Given reliable IPSC codings of units in each section a second type of agreement was sought between the obtained occurrence or nonoccurrence of shifts in affective quality as measured by coders of the present study and the presence or absence of concurrent major change in the IPSC codes (support to nonsupport and/or presence to absence of auxiliary codes, and the reverse change in each instance).

Of the 127 original IPSC units, 38 were excluded because of inconsistent IPSC coding (In Table 3 these are denoted by the symbol "?" in column D) or they occurred as singles (indicated by the symbol "n", also found in column D) and hence provided no sequence for comparison with measures of shifts in affective quality (indicated by symbol "*", found in column C). A further 33 IPSC units were excluded as they were the initial units (indicate in column D by the symbol "#") in a sequence. These reductions left 56 IPSC units gradable as expressing either agreement ("A" in column D) or disagreement ("DA" in column D) with concurrent presence or absence of obtained affective shifts.

There was agreement on 39 (A) of a possible 56 (DA + A) opportunities or 70% agreement between the criterion IPSC coding and the coding for affective change in quality. This supports the conclusion that the IPSC coding and the coding for affective change in quality both represent the same activity, the measurement in affect.

Further analysis of the inconsistencies between the coding for affective change in quality and the IPSC criterion revealed that the major difference was one where more changes in affective quality were found by coders in the present study than by the IPSC coders. This difference could be explained by the procedure for the IPSC coding of affect where the unit of analysis was defined by rules appropriate to the semantic structure of the speech. Only one affect code was allowed per unit in this manner, possibly obscuring affective changes within a unit.

TABLE 3

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	
1	40	40		#	(1-3) The coding of '40' invariably occurred at the reading of the question by one of the participants in the revealed differences exercise. It also occurred less predictably in the reading of the different (I said yes, you said no) responses that typically follow the question.
2	40	40		A	
3	40	40		A	
4	70	52	*	?	(4) The inconsistent coding, 70-52, is marked by an identified shift located within the IPSC unit, indicating independent variation of the semantic and affective sequencing.
5	60	51	*	?	
6	60	60	*	-	(13-14) The thesis coders were unaware of the circumstances of the interaction presented to them, including the presence of material that is being read, which was coded by IPSC coders as '40'; neutral.
7	61	60	*	?	
8	61	70	*	?	
9	61	61	*	#	(18-19) Like the sequence 9-10 above where IPSC coding was consistent, this segment contains an identified shift.
10	61	61		DA	
11	70	60		-	(20-22) The column 'B' code '60' in unit 21 may well be an error, note in columns A and C the agreement between IPSC code change and the identified shift. See also sequence 23-27 and especially 26-27.
12	60	60	*	#	
13	71	61		A	
14	40	40		A	
15	70	60		-	(28-31) This sequence involves major IPSC confusion with multiple shifts, possibly indicating the presence of ambivalent, mixed emotions.
16	60	50		#	
17	60	60	*	A	
18	60	60	*	DA	(20-22) The column 'B' code '60' in unit 21 may well be an error, note in columns A and C the agreement between IPSC code change and the identified shift. See also sequence 23-27 and especially 26-27.
19	40	40		#	
20	40	40		A	
21	40	60	*	?	
22	62	60		?	(28-31) This sequence involves major IPSC confusion with multiple shifts, possibly indicating the presence of ambivalent, mixed emotions.
23	51	61		#	
24	61	61		A	
25	50	61		?	(28-31) This sequence involves major IPSC confusion with multiple shifts, possibly indicating the presence of ambivalent, mixed emotions.
26	61	71	*	#	
27	50	50		A	(28-31) This sequence involves major IPSC confusion with multiple shifts, possibly indicating the presence of ambivalent, mixed emotions.
28	30	60	*	?	
29	40	50	*	?	
30	30	50	*	?	
31	30	50	*	?	(28-31) This sequence involves major IPSC confusion with multiple shifts, possibly indicating the presence of ambivalent, mixed emotions.
32	30	30		#	
33	40	40		#	(28-31) This sequence involves major IPSC confusion with multiple shifts, possibly indicating the presence of ambivalent, mixed emotions.
34	40	40		A	
35	40	40		A	

Table 3 Continued

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	
36	50	50		#	
37	60	50		A	
38	50	60	*	#	(38-39) A good correspondence between IPSC major code change and shift identification.
39	62	62		A	
40	50	60		-	
41	60	50		-	
42	32	20	*	-	(42) This IPSC inconsistency suggests either independent affective-semantic sequencing or the presence of ambivalent emotion.
43	20	60		?	
44	20	52	*	?	
45	20	30	*	#	
46	40	40		A	
47	40	40		A	
48	40	40		A	
49	50	30	*	-	(49) Again, a similar IPSC confusion.
50	60	50		#	(50-53) The consistency of IPSC coding here suggests a possible unidentified shift or shifts at either 51-52 or 52-53.
51	50	50		A	
52	52	52		DA	
53	50	50		DA	
54	50	40		?	(54-59) The change from positive to negative IPSC codes was identified by shifts, yet shifts were also identified at 56-57 and 58-59, perhaps noting the difficulty coding positive IPSC codes with auxiliary digits, i.e.; positive ambivalence.
55	50	60	*	#	
56	30	30	*	A	
57	30	30		DA	
58	20	20		A	
59	20	30		DA	
60	30	50		-	
61	30	30		#	
62	30	30		A	
63	40	40		#	
64	40	40	*	A	
65	40	40		DA	
66	51	40		?	
67	61	71	*	#	(67-68) Another good correspondence involving nonsupport codes and use of auxiliary digit coding.
68	60	60		A	

Table 3 Continued

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
69	50	50		#
70	60	60		A
71	51	50		?
72	61	60		?
73	61	61		#
74	61	61	*	A
74	40	40		A
76	30	50		-
77	60	50		#
78	60	60		A
79	50	50		A
80	60	60		-
81	50	50		#
82	61	62	*	DA
83	50	50		A
84	50	50		A
85	50	50		A
86	60	60		A
87	60	60		#
88	60	60		A
89	60	60	*	A
90	60	30		?
91	30	30	*	#
92	30	30	*	DA
93	20	51		?
94	40	40	*	#
95	40	40		DA
96	62	60		?
97	60	60	*	#
98	62	50		?
99	70	60	*	#
100	60	62	*	?
101	60	60		#
102	60	50		A
103	60	60		#
104	60	50		A
105	72	50	*	?
106	70	60	*	#
107	60	60	*	DA
108	60	60	*	A
109	60	60		DA
110	60	60		A

(77-90) Note the consistent correspondence from unit 77 through 90, especially 82-83 and 89-90 where code '60' in column 'B' may well be in error.

(91-93) This segment stands out as another indication of possible IPSC difficulties with positive codes and mixed emotional content.

(94-96) This discrepancy may be one of either premature shift identification or late IPSC code changes. See 19-21, 63,66.

(97-101) Again, some confusion in IPSC coding corresponding with several identified shifts, including a mid-unit shift. 99.

(105-107) More of the same thing as noted immediately above.

Table 3 Continued

	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	
111	60	61		?	
112	60	60		#	
113	62	60		?	
114	60	50		#	
115	60	40	*	?	(115-122) One example of good correspondence, 118-119, and several of poor correspondence, including at 115-116 a possible late IPSC change, and then two series of positive IPSC codes with shifts identified, 119-120 and 121-122.
116	40	40		#	
117	40	40		A	
118	61	61	*	DA	
119	20	20	*	A	
120	30	30	*	DA	
121	30	30	*	A	
122	30	30		DA	
123	60	40		?	(123-126) Similar problems as noted above, this time with nonsupport codes.
124	60	50	*	#	
125	60	60	*	DA	
126	60	50		DA	
127	60	40		-	

SYMBOL	DESCRIPTION	TOTALS
#	Indicates the initial unit of an IPSC sequence that is consistently IPSC-coded across both trials, columns A and B.	33
*	Indicates the location of a shift in the quality of affect derived by consensus of 5 or more (thesis) coders.	(42) ₁
A	Indicates agreement between IPSC coding and presence or absence of indicated shift in quality of affect.	39
DA	Indicates disagreement between the IPSC coding and the presence or absence of indicated shifts in quality of affect.	17
?	Indicates an inconsistent change in IPSC codes from support to nonsupport or presence to absence of auxiliary digits, or the reverse from the first trial (A) to the second (B).	27
-	Indicates an IPSC segment that contains only one unit	<u>11</u>
TOTAL IPSC UNITS		127

1 The number of locations is wholly redundant within the number of IPSC units and are not included in the total for that reason.

SUMMARY AND DISCUSSION

A review of the literature on the theory of emotion has revealed that the problem of emotion has traditionally presented both conceptual and methodological challenges to its many investigators. The conceptual difficulties are manifested by a complex and multifaceted series of problems that defy constructive synthesis. That the one hundred year history of serious work in the field has not produced a consensus regarding an appropriate definition of terms is evidence of this difficulty. In the absence of a consensus, systematic efforts to measure the subject have had to base their operationalizations on one or another arbitrary aspect of the phenomenon. The continuing lack of interface between theory and measurement has prompted some to assume that the field lies outside the bounds of normal science.

The necessary theory underlying this thesis is comprised of three assumptions: (1) that emotion exists in some meaningful way, (2) that emotion is available to an observer as communication predicated on an auditory and/or visual perceptual experience and, (3) that emotion is recognizable to this same observer as a function of some underlying commonality of experience and existence shared with others. The working definition of emotion was summarized as the following: Emotion is a mental process operating in an as yet incompletely specified domain of operations as a function of the common biological heritage of human beings and, as a component process, functions in the establishment of the common cognitive or communicative (verbal, vocal and behavioral) environment.

A series of twelve subjects was drawn from university classes and asked to attend to an audio-only tape of one voice taken from a previously recorded dialogue of a marital interaction. Instructions to the subjects were to indicate on a typed line-by-line transcript of the resulting monologue the position of the transition points or shifts in the quality of emotion perceived. Considerations as to the kind, value or meaning of the emotion perceived were not asked for.

Each individual's choices as to the occurrence or nonoccurrence of such events (shifts) were collated according to their position on the transcript. This yielded a frequency distribution for the amount of inter-subject agreement. The obtained frequency distribution was found to be significantly different from the appropriate Poisson generated expected distribution. Thus the hypothesis that naive coders can reliably differentiate affective change in quality as a function of position in normal unrehearsed speech was supported.

A second study was done using the affect scale coding from the IPSC investigation to establish criterion coding, a comparison with which supported the conclusion that both trained and untrained coders were similarly engaged in the measurement of affect. As such the use of an interactive or process technique seeking after the sequence of affective shift is supported as a reliable measurement procedure.

Prospects for further investigation center on the use of identified affective sequencing in elaborating the nature of the shifts or transition of one emotion to another. The opportunity becomes available to evaluate each affective unit as a reaction to the immediately preceding affective unit(s). Questions previously addressed on a purely intuitive basis might then find some sounder foundation on which to build models. One such question concerns the occurrence of mixed or ambivalent emotions and their description in interaction process terms.

APPENDIX: INSTRUCTIONS TO SUBJECTS

The testing room contained a desk and a chair situated in a corner against the wall opposite the entrance.

After greeting each subject personally an introduction was made to the testing room, indicating the transcript and tape player with earphones. Demographic information was taken at this time.

A demonstration of ability to appropriately manipulate the tape player was requested.

Instructions for the task were given specifying that the subject:

- follow the monologue on the tape auditorily with eyes closed and one hand on the machine's pause button;
- stop the tape when a change in the quality of affect or emotion was heard;
- open their eyes to mark the point of change with a penciled slash made across the line of the transcript as closely as possible to the point heard on the tape, reviewing a point was permitted, then closing their eyes to continue;
- proceed to the end of the tape repeating the procedure as many times as such changes were perceived;
- at the end of the tape to rewind and then replay the tape while attending visually to the transcript, anticipating hearing those affective changes as had been indicated, adjusting those markers to more closely approximate their auditory perceptions.

Subjects were then debriefed as to their perceptions of the task.

Affect or emotion was defined as a phenomenon that existed in some manner for everyone as a function of unknown underlying processes and as a phenomenon that contained changes or shifts in quality. The term quality was defined as being

synonymous with type, kind, or value of the emotion. Examples were given: good and bad, strong and weak, anger and sadness. Instructions were to ignore or avoid any such labeling of the phenomenon, noting only such differences as they occurred in the flow of emotion expressed. (Debriefing of subjects in a trial run of the experiment revealed that each subject could offer a large number of inferences about the content, purpose, motive, and context of the monologue. After being instructed to keep eyes closed, the number of such statements dropped substantially with the most common statement offered being a version of 'I don't know what was going on', coupled with inferences of having performed poorly.)

On the back of one page of the transcript two sine waves were drawn so that they intersected in the center of the page. Each line was described as representing one qualitatively distinct emotion. The uppermost line was described as representing the most available emotion to perception. The task was then described as analogous to marking as close as possible the point where the lines crossed, i.e. the emotional quality shifted.

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