CONTRIBUTIONS OF THE GERMAN "EXPRESSION PSYCHOLOGY" TO NONVERBAL COMMUNICATION RESEARCH

PART II: THE FACE

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> Ich wollte hindern, dass man nicht zu Beförderung von Menschenliebe physiognomisirte, so wie man ehemals zu Beförderung der Liebe Gottes sengte und brennte; Ich wollte Behutsamkeit bey Untersuchung eines Gegenstandes lehren, bey welchem Irrthum leichter ist und gefährlicher werden kann, als bey irgend einem andern, Religion ausgenommen . . . wir denken feiner, reden feiner und faseln feiner. Jetzt sind es die Zeichen an der Stirne die man deuten will, ehemals waren es Zeichen am Himmel. . . .
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> [I tried to quell those who physiognomize to promote the love of mankind, just as in the old days men burned and pillaged to promote the love of God; I tried to teach carefulness in investigation, where it may be easier and more perilous to err than anywhere else, except religion . . . we think more subtly, speak more subtly, and babble more subtly. Now we try to read signs in the face just as formerly we tried to read signs in the sky. . . .]
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> J.C. Lichtenberg, 1778

Facial expression has always been one of the favorite subjects of Expression Psychology. The German tradition of interest in the face begins with the monumental work of Lavater (1775-1778) and the biting satirical reply of Lichtenberg (1778). Lavater's work is a

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strange mixture of naive interpretation by analogy (cf. Part I of this series) and farsighted demands for an objective approach to the study of facial expression, culminating in the call for mathematically formulated rules for expression interpretation.

Lichtenberg's critique focused on the inadequate methodology of Lavater; Lichtenberg appears to be the first to clearly distinguish "physiognomic" (= static characteristics) and "pathognomic" (= dynamic characteristics, based on muscle movement) features of the face and to argue that only the study of the latter makes scientific sense.

Of much influence also were Engel (1885-86), who wrote a guide for actors regarding facial expressions on the stage, and Piderit (1867, 1886), who tried to formulate diagnostic rules for facial expressions caused by muscle movement.

Wundt, the father of—at least European—experimental psychology applied his "principle of psycho-physic parallelism" also to the study of facial expressions (Wundt, 1904). He postulated three basic affective dimensions (excitement-calm, pleasantness-unpleasantness, tension-relaxation), not only for affective experience but also for affective facial expressions. In addition, he did some work on facial expression in response to various tastes (sweet, bitter, sour).

Wundt's dimensional approach to facial expressions was not pursued further in Expression Psychology until Hofstätter (1956) completed the first factor-analytic study of facial judgments using Osgood's semantic differential (see Table 3 below).

Interestingly, neither Wundt's nor Hofstätter's pioneering work is mentioned in most of the current literature on facial expression; for example, it is not discussed in the influential review of Ekman, Friesen and Ellsworth (1972). This otherwise excellent book is a good example of the degree to which Expression Psychology is neglected in present research on the face. None of the 27 experiments discussed in the following review are mentioned in that book.

This seems to be due both to the language barrier and to the neglect of Expression Psychology even in current German research on nonverbal communication. The aim of this article is to supplement the present literature concerning research on the face (facial expression and perception) by a review of the experimental work done by Expression Psychology.

ISSUES AND METHODOLOGY

Although Expression Psychologists looked for applications mainly in psychodiagnostics, the encoding process of facial expressions and its dependence on personality characteristics was never experimentally studied. For facial expression, Expression Psychology was in fact a psychology of impression formation. There was no experimental work on the development of facial expressions, but a great deal of work on the development of facial perception. There was, with one notable exception (Wörner, 1940—see below), no attempt to study facial expressions in detail by means of objective measurement systems, but there were quite a number of experiments on the effects of facial areas and components on impression formation. These component studies, whether developmental (Bühler & Hetzer, 1928; Guernsey, 1928; Kaila, 1932; Ahrens, 1954) or not (Arnheim, 1928; Wolff, 1933; Brunswik & Reiter, 1938; Schmidt, 1957), constitute the core work of Expression Psychology on the face. Closely related are experiments on the effect of contextual information on facial judgment (Turhan, 1960), and studies comparing physiognomic and pathognomic cues in regard to impression formation (Eistel, 1953; Pfistner, 1958; Schüle, 1976). Tausch (1960) did an interesting study on the relative influence of facial and verbal cues on attitude change in children, and Schäfer (1934) investigated the accuracy of nonverbal communication of commands, emotions and bodily states.

In the articles mentioned, 27 experiments of greater interest for research on the face are reported. Of these 27 experiments, 13 were conducted with schematic faces (drawings) as stimuli, 8 with still photographs, 6 with real stimulus subjects, and 3 with filmed subjects. The striking dominance of schematic faces may be explained by the focus of Expression Psychologists on component studies: components can be systematically varied most easily in drawings. The problem of generalization from artificial to real facial stimuli was recognized by most authors, but it was regarded as being of secondary importance.

Experimental design and statistical analysis were poor in all experiments. Most studies lack representative stimulus sampling; the methods of stimulus design and variation seem to be not very inspiring for present research (an exception are perhaps some developmental studies). In most cases, facial stimuli were judged

in a free description task and this description—or, in developmental studies, the child's reaction to the stimuli—was categorized. Few authors used rating scales or a ranking technique. Regarding data analysis, none of these studies meet today's standards.

Although the experimental work of Expression Psychology on the face is not very interesting from a methodological point of view, some interesting questions were asked, and results have been found that are of more than historical interest. Therefore I will focus in the following discussion more on questions asked and results found than on methodological details. Interestingly, the situation is exactly the other way round for research on gait, gestures, and body movement; cf. Part III of this series (to be published in the next issue).

DEVELOPMENTAL STUDIES

All German developmental studies on the face were concerned with the development of perception and imitation of facial expressions. Buhler and Hetzer (1928) appear to have been the first to study systematically the infant's reaction to faces having different facial expressions. Their basic finding was that at the age of five months, infants for the first time clearly discriminate angry vs. happy faces, and that this discriminative response grows weaker after the seventh month. They interpret their data by a three-phase model of perceptual ability: three- and four-month-old infants react simply to the stimulus "human face" independent of its expression; five-to-seven-month-olds "reflect" (imitate) positive vs. negative expressions, and in the eighth month "understanding" begins: the infant transcends the compulsion to reflect recognizing the playful character of the situation. Stated in other words: eight-month-olds interpret the stimulus "facial expression" in its situational context. This first model of the development of facial perception was further elaborated and modified by the experiments of Kaila (1932) and Ahrens (1954).

Kaila showed that two-month-old infants respond differentially to a real and an artificial face; Ahrens found that they smile the more at a schematic face the more realistic it is. Kaila also discovered interesting developmental changes in looking behavior. Two-month-olds focus on each of two glass balls placed in eye-distance but fixate on a point between the eyes of a real face; at five

Table 1: Developmental Studies

Author	Subjects	Stimulus	Reaction	Results
Bühler & Hetzer, 1928	90 infants, 10 each age 3-11 mo.	happy vs. angry real face presented for 30 secs.	categorization of behavior into positive, negative and neutral reactions	reactions to angry face:

	months									
reactions	3	4	5	6	7	8	9	10	11
% positive	90	50	0	0	0	20	30	40	60
% negative	10	50	100	100	80	60	50	40	20
% neutral	0	0	0	0	20	20	20	20	20

Guernsey, 1928	200 infants, 10 each age 2-21 mo.	10 confrontations for 10 sec. on different days with each of 8 different real facial expressions	imitation responses	smile was initiated in 80% of cases or more at 15 mo. or later; all other stimuli were imitated only few times with a maximum of imitation tendency in the 5th month
Kaila, 1932	70 infants, age 2-7 mo.	(a) real face vs. two glass balls placed in eye-distance in paper (b) looking straight in infant's face and then turning head aside presenting profile (c) frowning or masking eyes vs. different mouth-expressions (d) 3 mouth movements	looking behavior, facial expressions, imitation responses	(a) 2-mo.-olds smile seeing face and fixate point between eyes; seeing glass balls they don't smile and fixate one of the two balls alternatively (b) first smiling, then stop smiling and searching for "lost eye" (c) 4-6-mo.-olds react negatively to change of eye-expression, not to change of mouth-expression (d) about 15• *of all* Ss *show* consistently imitative tendencies

Table 1 Continued

Author	Subjects	Stimulus	Reaction	Results
Ahrens, 1954 experiment 3	16 infants (institutionalized)	presenting at age of 2-5 mo. repetitively realistic drawings of laughing, neutral and angry face	categorization of behavior into positive and negative reactions	at age 2 mo. no differentiation, then gradually less positive and more negative responses to angry face
Ahrens, 1954 experiment 4	16 infants (institutionalized)	presenting at age of 3-9 mo. repetitively real face with different mouth expressions	attentive responses	at age of 3 mo no reaction to mouth movements in 8 Ss; later more reactions with a maximum at age 6 mo., particularly for broad mouth
Ahrens, 1954 experiment 5	18 infants, age 0;9-2;2 yrs. (institutionalized)	caregiver displays 4 expressions when S is affectively neutral and attentive: (a) broad mouth (b) smile (c) horizontal forehead wrinkles (d) vertical forehead wrinkles	categorization of behavior into positive and negative reactions	(b) elicits at age 0; 9 more positive reactions than (a); this is always the case at age 1;6; similar results for negative reactions to (d) compared with (c)

Table 1 Continued

Ahrens, 1954 experiment 6	72 children; 12 2-yr.-olds, 15 each age 3-6 yrs. (all institutionalized)	laughing and crying schematic face; photo of angry face	correct responses to question "who is laughing/ crying / sad, naughty,angry"; preference for laughing face ("whom do you like more?")		age (yrs)				
					2	3	4	5	6
				correct angry	5	10	12	15	15
				correct laughing	1	8	10	13	15
				correct crying	0	4	7	8	11
				preference for laugh.	1	4	7	9	11
Ahrens, 1954 experiment 1	15 infants, age 1-2 mo. (institutionalized)	schematic faces (a) with a strong black line as eyes (b) with 2 or more dots as eyes (c) with naturalistic eyes	smiling response	(a) 45%, (b) 73%, (c) 86% smiling; different facial contours had no effect on smiling					
Ahrens, 1954 experiment 2	16 infants (institutionalized)	presenting at age of 2-4 mo. repetitively schematic faces with (a) 2 dots as eyes, no mouth (b) naturalistic upper face, no mouth	attentive responses	at age 2 mo. stronger reactions to (b) in 8 Ss, at 3 mo. in 10 Ss, at 4 mo. in 12 Ss					

months they stop smiling and search visually for the "lost eye" of the experimenter's face when he turns his head aside presenting only his profile to the child. Four- and five-month-old infants react negatively both to frowning and to masking the eyes with paper (changes in expression of the upper part of the face), but they do not respond to changes in mouth expressions. Kaila concludes from these studies that the upper part of the face, particularly the eye region, is the specific facial stimulus for infants, and that the "reflection" of negative expressions around the sixth month that Buhler and Hetzer (1928) found is a response to the "strangeness" of these expressions, not an imitative response.

In a review of these experiments, Buhler (1934) agrees with this modification of her original model. She also agrees with Kaila's critique at the experiments of Guernsey (1928) on imitation of facial expressions in infants.

Guernsey found that in the fifth month there is a maximum of imitative responses to facial expressions other than smiling. Kaila calls attention to the fact that an identity between a stimulus expression and a response expression is not a sufficient criterion for imitation; the frequency of response expression has to be related to the frequency of the spontaneous occurrence of that expression. Kaila showed for mouth expressions that their frequency of spontaneous occurrence differs with age. Therefore, a change in the frequency of "reflection" of mouth expressions can possibly be caused simply by a change in the frequency of spontaneous mouth expressions. Kaila tried to distinguish "real imitation" from "fictitious imitation" in the above sense, and found tendencies to real imitation only in about 15% of his subjects (two- to seven-month-olds).

Contrary to the belief of Charlesworth and Kreutzer (1973) that "...no studies have been conducted with one- and two-year-old infants to determine the extent to which they recognize various facial expressions" (1973, p. 122), Ahrens (1954, Part II) did two experiments on exactly that question (experiments 5 & 6, cf. table 1). He showed that at about one and a half years of age a smile consistently elicits a different response from a broad mouth; also, vertical forehead wrinkles are discriminated from horizontal wrinkles (the first, part of anger expressions, elicit more negative reactions than the latter, part of fear or surprise expressions).

On the other hand, two-year-olds cannot correctly label facial expressions when asked to do so—obviously they have difficulties in understanding the instruction and the meaning of verbal labels

of emotion. But with increasing age they do increasingly better in this kind of task.

As these findings show, all developmental studies were particularly concerned with the role of specific facial components in eliciting specific behavioral responses. Although the earlier authors do not refer explicitly to Expression Psychology, they were surely influenced by this approach. Their interest in facial perception and detailed analysis of facial components was a reflection of the general trend of Expression Psychology at that time, as will be shown in the next section.

COMPONENT STUDIES

The rise of the Gestalt Psychology in Germany in the twenties influenced many Expression Psychologists (cf. Part I of this series). The concept of a perceptual gestalt, i.e., a perceptual pattern that is more than the sum of its parts, was applied to nonverbal expressions, particularly to the face. Arnheim (1928), who worked with Wertheimer in Berlin, did the first experiments on the question of whether facial expressions are perceived as Gestalts. Presenting paintings, still photographs and drawings of facial expressions to his subjects, Arnheim showed that the expression of a part of a face often changes when it is seen in the context of the whole face. This change of expression seems to be based on a change in the "figurative characteristics" of the face (descriptions of the form of a part change to an extent similar to the change in descriptions of the expression of this part). Since Arnheim appears to have chosen stimuli that produced the intended results most easily, it is not clear how strong this Gestalt-effect really is.

Brunswik and Reiter (1938) tried to further clarify this question by a systematic variation of physiognomic characteristics of schematic faces. Their subjects had to rank these stimuli for a broad range of attributes (age, intelligence, mood, etc.). The data showed that the "summative principle," i.e., a constant contribution of the expression of a part to the expression of the whole face independent of other parts, holds true for most attributes, except intelligence and strength of will (these were the attributes with the least interrater-agreement). The authors concede that this finding cannot be generalized to real facial expressions because of the highly schematized stimuli without any cues for expressions caused by muscle movements (wrinkles, etc.).

Table 2: Component Studies

Author	Subjects	Stimulus	Decoding Task	Results
Arnheim, 1928, experiment 85/86	128 students	selection of an expressive woman's portrait (painting); presenting upper half of face vs. whole face	free description of "eye-expression"	in 92% of Ss clear change of description from half face to whole face
Arnheim, 1928, experiment 87	42 students	selection of a photo of a baby's expression from a film; presenting upper half of face vs. whole face	same as in exp. 85/86	in 79% of Ss clear change of description from half face to whole face
Arnheim, 1928, experiment 88	81 students	2 profiles of heads, identical up to lower lip, different in upper lip and further up	free description of expression of different parts of the profiles	37% of Ss described differences in expression of the chins (which were identical)
Arnheim, 1928, experiment 89/90	117 students	same as in exp. 88	free description of the form of different parts of the profiles	25% of Ss described chins as having the same form, 48% incorrectly as having a different form
Arnheim, 1928, experiment 94/95	122 students	same as in exp. 88	identification of parts of the profiles that have the same form in both stimuli	35% of Ss answered correctly; 65% gave false answer (33%: no parts have same form, 30%: only chins are different, 2%: only lower lips are different)

Table 2 Continued

Brunswik & Reiter, 1938	10 students	presenting randomly $3\times3\times3\times7=189$ different schematic faces designed by systematic variation of forehead height, eye distance, mouth height, and nose length/nose peg	rank all stimuli for *intelligence, age,* strength of will, sympathy, beauty, character (good/bad) and mood (elated/sad)	the 2 most reliable ratings are mood and age, the 2 least reliable are intelligence and strength of will; the "summative principle" seems to be valid except for intelligence and strength of will; the ratings of mood and age, character and beauty and sympathy, intelligence and strength of will correlate highly; expressive cues: the wider the eyes apart, the more elated and younger; the higher the forehead, the more elated, younger, intelligent and strength of will; the higher the mouth, the more elated and younger the impression
Schmidt, 1957 (experiment done 1940/41)	about 750 Ss, age average 14 yrs.	different drawings of laughing and smiling faces with systematic variation of 7 relevant components	rank all stimuli for intensity of laughing or smiling expressed	omission of a component never changed the impression drastically; the rank order can be predicted fairly well by the weighted sums of the perceived intensity of single components; a supranormal cue (a very big laughing mouth) has more expressive value than any combination of the other "normal" cues

Schmidt (1957, study done 1940/41) used more realistic drawings in his study on laughing and smiling and tried to vary systematically facial components that are representative of these expressions. By ranking experiments for intensity of laughing/smiling he showed that the summative principle fits the data fairly well. He interpreted this result in terms of the ethological concept of an innate releaser mechanism for the recognition of laughter and smiling.

None of these studies can really claim to provide a representative design for the study of facial recognition (ironically, it was Brunswik himself who later called for such designs in psychology). A selection of photos and film scenes guided by an anatomically based description system for facial expressions such as the FACS of Ekman and Friesen (1978) could better resolve the question of whether facial expressions are perceived as Gestalts in a synthetic fashion or are processed analytically.

This question relates directly to recent research on hemispheric lateralization of facial recognition. There is now ample evidence that the right hemisphere dominates facial perception in right-handed subjects, at least for higher-order processes (Moscovitch, Scullion, & Christie, 1976). Because of the preference of the right hemisphere for Gestalt-like stimuli in right-handed subjects, this supports the view of Arnheim (1928) that facial expressions are perceived as Gestalts.

There is another study of Expression Psychology relating to lateralization research. Wolff (1933), like Arnheim working with Wertheimer in Berlin, compared the right and left sides of neutral facial expressions on photographs with the whole face by combining each half with its mirror-image and comparing these two composites with the original face. He found some evidence that the right half of the face is perceived as more similar to the whole face than the left half. This case study found experimental support later and is now interpreted by a dominance of the left visual field (the right hemisphere) in the perception of facial stimuli (see Sackeim & Gur, 1978, for a review).

Besides this study, Wolff did some other work on facial expression and personality; it is described in his English book (Wolff, 1943).

OTHER STUDIES ON IMPRESSION FORMATION

Expression Psychologists were fully aware of the fact that physiognomic cues influence the perception of facial expressions,

a fact that seems to be underestimated by present research on the judgment of facial expression. We have already discussed Brunswik and Reiter's finding that there is more than chance agreement of observers on the expressive value of certain physiognomic features. Three studies of Expression Psychology were concerned with the interaction of physiognomic and pathognomic cues in impression formation. Eistel (1953) varied both cues in schematic faces and found a clear dominance of pathognomic cues in determining the free description of the expressions. Pfistner (1958) approached the problem by comparing photos of neutral facial expressions with filmed posed and spontaneous emotional expressions of the same subjects; because of inadequate experimental design and data analysis, criticized in detail by Vukovich (1958), the results cannot be interpreted unambiguously.

A recent attempt was made by Schüle (1976) by comparing photos of neutral facial expressions with photos of eight posed emotional expressions of the same subjects. He found that the subjects that were rated happier in the neutral condition were also rated happier overall in the emotional conditions. His conclusion that this effect is due to "happy" physiognomic features of these subjects is not compelling, because he did not measure the degree of happiness caused by the pathognomic cues alone.

More interesting than this result is Schüle's finding that the rating of intensity of facial expressions varies significantly with the exact instruction given to subjects concerning how they are to judge intensity. Ratings of the "intensity of facial expression" covaried closely with ratings of intensity when the judges were instructed to focus on "figurative-kinematic features," i.e., expressive cues determined by muscle movement; on the contrary, ratings of "intensity of the emotion expressed" yielded quite different results. The judgment of intensity of emotion appears to depend on other factors besides the intensity of facial muscle tension. Again, Schüle's interpretation that physiognomic cues are responsible for this difference is not compelling; judges may use additional cues such as degree of tension or purity of the quality of the emotion expressed in determining the intensity of the emotion expressed.

Both the problem of the influence of physiognomic cues and of the exact nature of the cues used in the judgment of intensity of emotion could be further clarified by objective measurement of the intensity of facial expressions caused by muscle movements; the FACS of Ekman and Friesen (1978), supplemented by an inten-

Table 3: Other Studies

Author	Subjects	Stimulus	Decoding Task	Results
Schäfer, 1934	16 children, 6-8 yrs. old of normal school, and 10 boys, 6-14 yrs. old, of low IQ	118 enactments of commands, emotions and bodily states (hungry, feeling hot, . . .) by pantomime	recognition of the encoded content (direct observation of encoder)	% correct recognitions normal: commands 69%, emotions 46%, bodily states 80% low IQ: commands 91%, emotions 75%, bodily states 88%
Eistel, 1953	534 male, 366 female	presenting one of 3×3=9 drawings of faces varying in expression (angry, happy, neutral) and physiognomy (hair, contour)	free description of drawing for actual state, character, abilities and typical behavior, also for special impression	categorization of answers yielded: average rank correlation between raters split into 2 groups for descriptions of faces with same expression and different physiognomy=.64, for faces with same physiognomy and different expressions =.47
Hofstätter, 1956	30-50 students	selection of 8 Frois-Wittman-photographs	rating on semantic differential	factor analysis of ratings yielded two orthogonal factors "positive attitude" and "negative attitude" explaining 74% of total variance
Pfistner, 1958	40 students	2 male adults were photographed (6 different perspectives of head posing neutral expression) and filmed (14 scenes of different emotional content, both posed and spontaneous expressions	each S rated either photos or film of one model for personality traits (yes/no format); film scenes were also assigned to a random order of "experts," scene descriptions	scene assignment agreed with experts' codings highly significantly; personality ratings exceeded change level of agreement significantly only for one model (both for photos and film)

Table 3 Continued

Author	Subjects	Stimulus	Decoding Task	Results
Tausch, 1960	72 children, 11-14 yrs. old	3 drawings of teacher's face (friendly, neutral, unfriendly) combined with 3 verbal prohibitions (personal-autocratic, unpersonal autocratic, social-integrative), i.e. 3×3=9 stimuli	choosing of the stimulus that most likely (a) stops the prohibited action (b) leads to continued action	little, but significant differences in facial cues: friendly face leads to more, unfriendly face to less assumed stop of action than neutral; verbal cues were much more effective than facial ones; social-integrative prohibition leads to more, autocratic prohibition to less assumed stop of action, independent of facial cues
Turhan, 1960, experiment 1	10 students	selection of 10 pictures from magazines showing at least 2 people with emotional facial expressions and many situational cues	free description of facial expressions of people by (a) viewing only their face (b) viewing the whole picture	of all judgments, 84% change from (a) to (b)
Turhan, 1960, experiment 2	10 students	selection of a picture showing a fight between two soldiers A&B with angry faces; face of A was replaced by a neutral face of A from another picture	free description of A's expression (a) in manipulated fight scene (b) on photo showing only A's neutral face	of all judgments, more than 90% change from (a) to (b)

Table 3 Continued

Turhan, 1960, experiment 3	133 students	production of a film of happy, sad and anxious family scenes enacted by 5 actors; besides the appropriate emotion each actor displayed also two inadequate emotions for 10 sec each (thus there were 10 different inadequate emotions displayed in each scene)	after each scene Ss were asked whether they had noticed inadequate emotions displayed by one or more actors	Ss noted on the average 1.3 inadequate emotions
Schüle, 1976	9 female, 5 male students	photos of Ss' faces posing 8 emotions: neutral, disgust, anger, fear, pain surprise, happiness, joy	photos were rated by other students for (a) intensity of expression (b) intensity of figurative-kinematic features (c) intensity of emotion expressed (d) happy/unhappy (e) age; triplets of photos with 2 identical models and 2 identical emotions expressed were rated for the two most similar photos	(a) and (b) correlated highly, (c) showed little correlation with (a) or (b); Ss rated happier in the neutral pose were also rated happier on the average in the emotional poses; (e) correlated significantly with (a) & (b); identical emotional expressions dominate identity of models for intense expressions in the judgment of similarity

sity scale for each action unit, could provide such an instrument for objective measurement.

Turhan (1960) did the only study of Expression Psychology on the influence of the situational context in the judgment of emotional facial expressions. Like most experimental approaches of Expression Psychologists, his experiments lack representative stimulus sampling. His findings show that sometimes contextual cues dominate facial expression, but they permit no conclusions about the relative influence of these cues or about the moderator variables that determine which of the two sources of information dominates the impression. Hofstätter's (1956) factor-analytic study of facial judgments was already mentioned in the introduction.

Tausch (1960) did what is apparently the first experimental study on the differential influence of verbal and facial expressions on the attitude change of children. She found that verbal content dominates facial expressions in situations where teachers try to prohibit a child's behavior. A similar dominance of the verbal channel compared with the visual channel in the impression formation of children was later found by Bugental, Kaswan, Love and Fox (1970). Finally, there is an early study on the communication accuracy of nonverbal behavior done by Schäfer (1934). He showed that normal six- to eight-year-olds can communicate commands and bodily states such as hunger more effectively by pantomime than they can communicate emotions; this relative difficulty in communicating emotions nonverbally is less prevalent in six- to fourteen-year-olds of low intelligence. The difference between the three types of communication contents seems to be due to the fact that there were gestural emblemes (cf. Ekman, 1976) available for most commands and bodily states used in this experiment that can be decoded more easily than can nonverbal emotional expressions. Schäfer interprets the group differences to be a result of a better encoding ability of children of low intelligence; the data do not allow a decision regarding whether this conclusion is true or whether the higher age of the low-intelligence group caused the difference.

STUDIES ON FACIAL BEHAVIOR

In the tradition of Piderit (1867, 1886) and Darwin (1872), Expression Psychologists such as Strehle (1954) and Lersch (1955) tried to establish a kind of lexicon of facial expressions (cf. Part I of this series). The authors favoring this lexicon approach based

their descriptions on case studies and personal observations and never made a serious attempt to validate their hypotheses empirically.

Two studies deserve more attention. Giessler (1912) discussed the role of facial muscle movements; influenced by Wundt (1904) he appears to be the first who emphasized strongly the regulatory role of facial muscle movements in attention and emotional control. After a detailed discussion of the action of the frontalis and superciliaris muscles in attention, thinking and emotion, Giessler hypothesizes that tension of the frontalis muscles furthers a widening of attention and imagery and divergent thinking, whereas tension of the superciliaris muscles promotes a narrowing of attention and imagery and convergent thinking. He argues that early in evolution these functions were simply parts of emotion processes, but that they later became partly independent and can be used by modern man in voluntary acts of attention focusing and defocusing and emotional control. In this sense, Giessler's work is a precursor of present theories stressing the role of facial muscle tension in the regulation of emotional processes (Izard, 1971; Schwartz, 1976). Worner (1940) did the only study of Expression Psychology on facial expression that reached the high standard of measurement techniques otherwise applied by Expression Psychologists only to body movement (cf. Part III of this series). By frame-by-frame analysis of Rhesus monkeys' chattering and anger expressions he found that it was impossible to relate different facial positions to specific internal states. An expression such as chattering is a rhythmic movement characterized by its dynamic cues, whereby its intensity is expressed by long duration and short pauses. The amplitude of facial muscle movements seemed to be fairly constant under differently arousing conditions. Worner found the same importance of time characteristics of facial expression for anger expressions. He also compared the contraction of different single facial muscles (measured by a microanalysis of the skin movement) in the course of an anger expression. Although these were only case studies, Worner's methodology and his emphasis on dynamic characteristics of facial expression have no equal in Expression Psychology or in most current research on facial expression relying on "typical moments" of the expression or on facial muscle amplitude. Only very recently research has begun to tackle again the question of the information provided by dynamic characteristics of facial movements (cf. Bassili, 1979).

Expression Psychologists did many descriptive studies on the facial expression of particular states and traits. But in all these studies facial behavior was only casually described and unsystematically analyzed.

Dembo (1931), a scholar of Lewin, considered facial expressions in her extensive work on angry behavior. She tried to classify all angry behavior and found that "pure" anger expressions such as a clearly angry face occur either during low-intense or during high-intense anger, i.e., she hypothesizes a U-function between intensity of anger and intensity of anger expression.

Lewin (1927) himself did a case study on schoolchildren's crying, startling and withdrawal behavior; he used these data only for an illustration of his general theory of expression (cf. Part I of this series). Other authors gave casual descriptions of facial expressions in various contexts: Keilhacker (1944: anger and sadness), Schelling (1939: problem solving), and Fritze (1942: highly arousable boys in differently arousing situations).

Summarizing this review of studies on the face done by Expression Psychologists, we may say that the studies on facial behavior appear to be disappointing—except for the contributions of Giessler (1912) and Worner (1940). In a review of social and cultural determinants of expressive behavior Fränke (1967) concludes that Expression Psychology contributes nothing of significance to this problem—only some obscure articles about race differences influenced by the Nazi ideology. On the contrary, the studies done on the perception of facial expressions, particularly on the contribution of different facial components or areas to the impression of naive observers have asked questions and have yielded results that seem of interest for today's research on the face.

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