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Referent Communication of Chronic Schizophrenics and Chronic Alcoholics under Simultaneous and Successive Task Presentation

Gerhard Heim and Rudolf Cohen

Fachgruppe Psychologie, University of Konstanz, Federal Republic of Germany

Summary. Sixteen chronic schizophrenics and 16 chronic alcoholics were presented pairs of colors with the instruction to describe one of them (referent) so that an unknown listener could distinguish the referent from the other color (nonreferent). In one experimental condition patients were asked to name the nonreferent before they were instructed to describe the referent (successive presentation). In the other condition a parallel set of display colors was presented simultaneously with the instruction to describe the referent. Both groups of patients communicated equally well under both modes of presentation. In both groups communication accuracy decreased while response latency and references to the nonreferent increased, the more difficult the colors were to discriminate. Schizophrenics, but not alcoholics, referred more often to both the colors in a display if the successive mode of presentation was administered before the simultaneous mode. They showed a steeper slope of utterance length across levels of difficulty than the alcoholics. In the schizophrenic group, the degree of general psychopathology as well as paranoid and anergic tendencies correlated negatively with communication accuracy, utterance length, and the number of descriptions referring to both colors of an item in the simultaneous presentation condition. Results were discussed with respect to earlier work with Cohen's (1978a) referent communication task.

Key words: Schizophrenia – Alcoholism – Verbal communication – Attention – Psychopathology

Introduction

In a series of studies Cohen and co-workers (Cohen 1978a, b) examined the impairments of schizophrenics in interpersonal communication. An explicit set of stimuli, words or colors, was presented to a subject ('speaker') who was instructed

Offprint requests to: Gerhard Heim, Krankenhaus Spandau, Neurol.-Psychiatr. Abtlg, Stat. 17, D-1000 Berlin 20

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to provide a verbal response to one of them (the 'referent') such that an unknown listener would be able to identify the referent. The proportion of listeners who were able to identify the referent was taken as a measure of the 'communication accuracy' of a given utterance. Supported by the work of Smith (1970) and Davis and Blaney (1976), the listeners demonstrated that schizophrenic patients' utterances were lower in communication accuracy than those of normals. In addition, these studies shed some light on the nature of the impairment in communication. Since schizophrenics were poorer than normals as speakers but not as listeners (Cohen and Camhi 1967), it was concluded that "schizophrenic speakers draw ('sample') potential referent-responses from the same underlying repertoires as do normal subjects, but when inappropriate responses are sampled, they are less likely to be edited out ... prior to their intrusion into speech" (Cohen 1978b, p 314).

To examine further the deficit assumed to occur at the second ' comparison' or 'editing' stage according to this two-stage model of referent communication (Rosenberg and Cohen 1966), the similarity in hue of referent and nonreferents were systematically varied in different sets of colors. The more similar the colors, the more self-editing is required before an appropriate response can be emitted. Response time and utterance length were taken as indices of the amount of self-editing activity. The results from a study with acute patients (Cohen et al. 1974) and a study with chronic patients (Kantorowitz and Cohen 1977) showed striking differences: acute patients showed an even steeper slope of response latency and utterance length across levels of difficulty than normals, while the slopes were flat for chronic patients. The authors suggested on the basis of the protocols and the poor communication accuracy of both groups of patients, that the increased effort of acute schizophrenics to reject sampled but inappropriate responses was rendered ineffectual by perseverative tendencies. Rejected responses were re-sampled until the speaker stopped sampling from his repertoire of responses to the referent and instead began to sample associates to his perseverative response ('Perseverative Chaining Model'). Chronic schizophrenic patients on the other hand appeared to have abandoned such futile efforts. Their "referent communication ... can be described as a one-step (sampling only) process, leaving out the self-editing stage. According to this Impulsive Speaker Model ... the speaker merely describes the referent per se without considering the context" (Kantorowitz and Cohen 1977, p 7).

Alternatively the finding that referent descriptions of chronic patients "rarely went beyond common color names even for high-similarity displays" (Cohen 1978b, p 317) may be because they have focused attention entirely on that one color chip designated 'referent'. Such an interpretation would be in line with Silverman's (1964) notion of reduced scanning in chronic, nonparanoid schizophrenics, assumed to be responsible for the decrease in size constancy often found in this group of patients (Meyer-Osterkamp and Cohen 1973). According to Venables (1964) "chronic schizophrenic patients ... tend to be characterized by a state of restriction of the attentional field, ... acute (and possibly the reactive and paranoid) patients ... by an inability to restrict the range of attention" (p 41). Summarizing the available evidence Broen (1968) further suggested that "there is ... some lawfulness to this narrowing (of attention) in that prominent cues ... tend

to be overly focussed on to the relative neglect of less prominent information" (p 164). It seems conceivable that the mere naming of the referent's color could result in part from this narrowing of attention to the one stimulus that was highlighted by the instruction.

It was the aim of this study to examine whether such a restriction of attention to the referent stimulus might have contributed to the findings of Kantorowitz and Cohen. Would the chronic schizophrenic still tend to describe the referent without regard to the nonreferent, if he were forced to attent also to the nonreferent? To test this notion, two parallel forms with color displays were developed. In one experiment subjects were shown the nonreferent first and asked simply to name the color. Subsequently, the referent was added and subjects were instructed to give a description that might allow discrimination between the referent and the nonreferent. In the other, referent and nonreferent were presented simultaneously, corresponding to the Kantorowitz and Cohen study except that two instead of three color chips were presented per item to avoid the repeated presentation of identical colors in different items. Chronic alcoholics rather than normal subjects were recruited for the control group to gain information on the diagnostic specificity of the schizophrenics' communication performance.

Methods

Stimulus Materials. Stimuli were taken from the 320 color samples in the Munsell Book of Colors (Berlin and Kay 1969). These colors divide the hue spectrum into 40 perceptually equidistant hue steps with eight degrees of brightness (value) and maximum saturation (chroma). Two parallel forms of 15 two-color displays were developed with five items for each of three levels of difficulty (15, 10, and 5 hue steps apart between the two colors of a display). Leaving out 80 colors with extreme brightness values, the remaining 240 color samples were presented to three normal volunteers with the instruction just to name them; only items which were given the same basic color term by all three subjects were used for the experiment. For items with colors only 10 and 5 hue steps apart it was further required that both the colors of a given display were named by the same basic color term.

Aiming at equal difficulties for the two parallel forms, pairs of two-color displays with the same hue step distance between the colors, were presented to another group of eight normal volunteers. They were asked first to describe the referent color from one of the displays such that an unknown listener could identify it, and then to do the same with one of the colors from the second display. Following each pair of items in the randomly presented series they were asked to decide which of the two items was more difficult. The parallel forms for the final experiment were arranged so that they showed an equal distribution of these scores for each level of difficulty (Heim 1979).

The classification of items according to levels of difficulty with respect to distance in hue steps between the two colors of a display was found to result in approximately equal communication accuracy scores for medium and high levels of difficulty. Since we were interested in possible interactions between Diagnostic Group and Level of Difficulty with regard to response latency and utterance length, some of the items were rearranged according to their mean accuracy scores for all 32 speakers in the final experiment. When taken together, the five items with the highest, intermediate and lowest ranks for each parallel form resulted in a new three-level classification. Unless indicated otherwise, the results based on this latter classification of difficulties will be reported. Each color sample of an item was 2.0×1.6 cm; it was enclosed in a dull gray plastic frame (5.0×5.0 cm).

Experimental Design. The two colors of an item were presented either simultaneously or successively. Half of the subjects in each diagnostic group were first presented with the 15 pairs of colors of one parallel form simultaneously; subsequently they were given the 15 items of the other form successively. The remainder of the subjects had the order of presentation reversed. Each parallel form occurred equally often in each combination of tests and order of presentation. Within each form the order of the items was random. Those 30 colors defined as referents for half of the subjects in each group were used as nonreferents for the other half. In contrast to Kantorowitz and Cohen (1977) each of the colors was designated as referent once only.

Subjects. Sixteen male chronic schizophrenics and 16 male chronic alcoholics from three different psychiatric hospitals in West Germany served as subjects. The two groups were comparable in age, education, verbal intelligence and length of hospitalization (Table 1). Verbal intelligence was measured by a multiple-choice vocabulary test, the Mehrfachwahl-Wortschatz-Test (MWT) by Merz et al. (1975). Though every attempt was made to find groups that were comparable as to length of illness and hospitalization, schizophrenics were hospitalized somewhat longer and had more admissions than alcoholics (see Table 1).

Schizophrenics were diagnosed according to the Research Diagnostic Criteria (Spitzer et al. 1975) by the attending psychiatrist and double-checked by a psychologist on the basis of clinical notes. Patients with a known history of alcoholism, drug dependence or neurological disease were excluded. Thirteen patients were on maintenance doses of neuroleptic medication (Equivalent dose in mg Chlorpromazine per day: *Med* = 150 mg; Range = 70–343 mg), which had been unchanged for at least 3 weeks. Three patients were without medication. The attending psychiatrist and the clinical notes reported that all schizophrenics had predominantly non-paranoid symptoms over the preceding weeks. The alcoholics corresponded to the diagnostic criteria for alcohol dependence of DSM III (1980). Although the majority of these patients showed severe impairments in their social and occupational functions, none of them had ever displayed the characteristic symptoms of schizophrenic or major affective disorders according to their clinical notes. No patients received tranquilizers.

All patients were rated by the attending psychiatrist on the Brief Psychiatric Rating Scale (BPRS) of Overall and Gorham (1976). As anticipated, schizophrenics were more disturbed than alcoholics in Total Psychopathology, Thought Disturbance and Anergia ($P = 0.05$). Subjects were screened for color blindness using the Ishihara Test (Ishihara 1977). Two schizophrenics and two alcoholics were excluded due to color blindness. Two other schizophrenics were excluded because they were not prepared to finish the session.

Table 1. Means and standard deviations of subject characteristics

	Alcoholics ($n = 16$)		Schizophrenics ($n = 16$)		Alcoholics vs. schizophrenics[a]	
	M	SD	M	SD	*t*	*df*
Age (years)	38.8	11.6	34.2	10.5	1.18	30.0
Education (years)	8.8	0.7	9.3	1.9	−1.10	17.0
Intelligence (MWT)	100.0	8.1	101.0	11.9	−0.42	27.0
Total hospitalization (months)	18.6	9.6	28.1	18.7	−1.81	22.0
Number of admissions	3.0	1.9	5.0	2.9	−2.32*	30.0
Years since first hospitalization	3.5	2.6	7.0	4.5	−9.60**	21.0

[a] In cases of heterogeneous sample variances approximations for *t* and *df* were used (Winer 1971)

* $P < 0.05$

** $P < 0.01$

All patients received DM 7.50 for their participation in the study, which lasted approximately 45 min. Twelve university students aged 20 to 30 years, served as volunteer judges to determine the communication accuracy of the speakers' referent descriptions. Another student analyzed the descriptions linguistically. They were also paid DM 7.50/h for their participation.

Procedure. Each patient was examined individually in rooms illuminated by day-light. After color vision and verbal intelligence (Merz et al. 1975) had been tested the main task was explained. The instructions for the simultaneous mode of presentation read (translated into English): "I will show you two colors and point to one of them. You should describe this color so that another person presented with the same colors—though possibly in a different order—will know which color you are talking about." The instructions for the successive mode of presentation were: "I will show you a color and you shall tell me the name of that color." Nonreferent was presented. "What ist the name of this color?" After the patient's answer the referent color was put beside the nonreferent. "Now look at this second color. You should describe it ... (see above)."

There were three sample trials for each mode of presentation to ensure that the patient had understood the instructions. After the items of the first parallel form were completed, the experimenter informed the patient that half of the test was completed and offered him a break. Subsequently, the other task was introduced: "and now we'll do the task a little differently".

The subject's answers were tape-recorded and written down simultaneously by the experimenter. Response latency and—for the successive mode of presentation—the interval between the presentation of the nonreferent and the beginning of his utterance were measured using a stopwatch.

To determine 'communication accuracy', each of the 960 descriptions (32 speakers × 2 conditions × 15 items) was typed on a separate card. Thirty-two sets with one description for each item were formed by randomly selecting descriptions from all speakers and both conditions. Each of the 12 'listeners' received eight of these sets presented in random order, so that every description was rated by three independent judges. They were asked to indicate the referent color of a given pair on the basis of the speaker's description provided on the card, and to rate the certainty of their decision from 1 ('rather uncertain') to 3 ('highly certain'). In the successive mode of presentation, the naming of the nonreferent was given together with the description of the referent.

The average reliability of the three judges was $\Phi = 0.63$. In a further experiment, all the 960 target descriptions were reviewed by another volunteer judge as to whether there was any reference to the nontarget color, either by mentioning it directly or by using the comparative form (e.g. "the one I mean is greener than the other").

Results

Communication Accuracy. Communication accuracy was defined as the sum of the ratings from the three listeners with respect to the certainty of their choice. If the wrong color had been chosen by a judge his score for that item was given a negative value. The resulting accuracy scores for a given description could therefore vary from −9 to +9. Each speaker obtained six communication accuracy scores (three levels of difficulty, two modes of presentation).

Table 2 shows the means and standard deviations of the communication accuracy scores for each group under the different experimental conditions. An analysis of variance revealed no significant effects for Diagnosis ($F(1,30) = 0.06$), Mode of Presentation ($F(1,30) = 1.35$), or the interaction of Diagnosis and Mode of Presentation ($F(1,30) = 0.02$). Only Level of Difficulty accounted for a major portion of the variance ($F(2,60) = 133.68$, $P < 0.001$). If Level of Difficulty were defined in terms of hue steps apart (15, 10, 5), the factor would account for approximately the same variance ($F(2,60) = 129.93$, $P < 0.001$).

To allow better comparison with the results of Kantorowitz and Cohen (1977), the number of correct choices by the group of listeners was determined, taking an average rating of $\geq +1$ as a correct choice. Overall, the results are the same: For the simultaneous presentation 76% of the schizophenics' and 75% of the alcoholics' descriptions led to correct choices of the referent color, for the successive presentation the proportions were 79% and 80%, respectively. Even when the scores for only the two higher levels of difficulty from the first mode of presentation per subject were analyzed, neither Diagnosis, nor Mode of Presentation, nor the interaction of the two factors proved to be significant ($F(1,28) \leq 0.90$).

Response Latency. Analysis of variance was carried out on the log-transformed latencies between the presentation of the referent and the beginning of a verbal response. Table 2 presents the means and standard deviations of the average log-transformed latencies for the three groups under different experimental conditions. Again, there is no effect for Diagnosis ($F(1,30) = 0.48$), Mode of Presentation

Table 2. Means and standard deviations of communication accuracy, response latency and utterance length for alcoholics and schizophrenics

Mode of presentation	Level of difficulty	Alcoholics		Schizophrenics	
		M	SD	M	SD
		Communication accuracy			
Simultaneous	Low	40.0	5.0	41.0	5.8
	Medium	24.0	9.3	27.0	9.2
	High	13.0	10.7	11.0	12.3
Successive	Low	40.0	7.1	40.0	7.0
	Medium	29.0	8.4	27.0	11.0
	High	14.0	7.8	16.0	9.6
		Response latency (sec_{log})			
Simultaneous	Low	1.38	1.29	0.81	1.09
	Medium	1.74	1.49	1.44	1.07
	High	1.81	0.92	1.61	1.78
Successive	Low	0.63	1.24	0.96	1.05
	Medium	1.35	1.06	1.14	0.84
	High	2.04	1.09	1.75	1.26
		Utterance length (log)			
Simultaneous	Low	2.69	2.27	2.43	2.42
	Medium	2.78	2.02	2.70	2.44
	High	2.74	2.12	3.43	2.48
Successive	Low	2.72	1.33	2.81	1.56
	Medium	3.08	1.23	3.46	1.77
	High	3.26	1.20	3.61	1.92

($F(1,30) = 0.63$), or the interaction between Diagnosis and Mode of Presentation ($F(1,30) = 0.58$). The only significant effect was for Level of Difficulty ($F(2,60) = 18.05$, $P < 0.01$). There was a strong linear trend ($F(1,60) = 19.81$, $P < 0.01$) indicating an increase in latencies with higher levels of difficulty. If Level of Difficulty were defined by hue steps apart (15, 10, 5) instead of communication accuracy, the linear trend would be ($F(1,60) = 14.00$, $P < 0.01$).

To control for general speed of responding, the average log-transformed latency for naming the nonreferent in the successive mode of presentation was used as a covariate. Again, except for Level of Difficulty ($F(2,59) = 14.97$, $P < 0.001$) none of the effects proved to be significant ($F \leq 1.9$).

Utterance Length. Utterance length was defined as the log-transformed number of words per response. Table 2 shows the means and standard deviations for both groups under the different experimental conditions. There was a significant effect for Level of Difficulty ($F(2,60) = 14.69$, $P < 0.001$) and a significant interaction between Diagnosis and Level of Difficulty ($F(2,60) = 3{,}80$ $P < 0.05$). The linear trend across Levels of Difficulty was more pronounced in the schizophrenics ($F(1,30) = 10.60$, $P < 0.01$), than in the alcoholics ($F(1,30) = 3.90$, $P < 0.1$). No other effect was significant ($F(2,60) < 2.47$). Defining Level of Difficulty according to hue steps apart resulted in a linear trend with $F(1,60) = 9.63$, $P < 0.01$.

Linguistic Categorization of Descriptions. All descriptions were categorized as to whether they described only the referent color or also referred to the nonreferent color. The two categories were exhaustive and mutually exclusive. Table 3 shows the percentage of descriptions with reference to both stimuli of a display. For the simultaneous mode of presentation 51% of the schizophrenics' and 58% of the alcoholics' descriptions referred to the index color only; for the successive mode of presentation the proportions were 61% and 64%, respectively. The differences between the groups were not significant ($\chi^2(1) = 1.26$, and $\chi^2(1) = 0.26$).

To test whether the number of responses referring to both the referent and the nonreferent increases if the successive mode of presentation preceded the simultaneous mode, the proportion of such responses under the simultaneous condition were compared, depending on whether or not this condition was preceded by the successive mode of presentation. Of the descriptions from the schizophrenics who had the successive mode of presentation first, 57% referred to both the stimuli in a display ($\chi^2(1) = 10.35$, $P < 0.01$), compared with only 36% of the schizophrenics' without this kind of experience. Such a difference was not found for the alcoholics with 38% and 41% respectively ($\chi^2(1) = 0.16$). The

Table 3. Percentage descriptions with references to both colors of a display for alcoholics and schizophrenics

Mode of presentation	Simultaneous			Successive		
Level of difficulty	Low	Medium	High	Low	Medium	High
Alcoholics	34.0	40.0	45.0	8.0	32.0	39.0
Schizophrenics	39.0	46.0	52.0	8.0	40.0	48.0

difference between the two χ^2-values was significant ($z = 3.26$, $P < 0.01$) according to a test proposed by d'Agostino and Rosman (1971).

Serial Position of Tasks. Since the design was balanced with respect to serial position and mode of presentation, i.e., each mode of presentation was realized only once, either as the first or the second task, these two factors were confounded: therefore separate analyses of variance were carried out with Serial Position instead of Mode of Presentation was the within-subject factor. Neither for communication accuracy, nor for response latency or utterance length, was there a significant main effect for Serial Position ($F(1,30) \leq 1.91$) or any interaction with this factor ($F(2,60) \leq 2.11$). Finally, no formerly significant effect disappeared and no formerly nonsignificant effect passed the 5% limit.

Influence of Psychopathology. The total score from the Brief Psychiatric Rating Scale (BPRS) and the scores for its five subscales were correlated with communication accuracy, response latency, and utterance length for the two modes of presentation. Since there was a strong bottom effect for the alcoholics in the BPRS scales these correlations were only determined for the schizophrenic patients. Furthermore, only the 10 items from the two higher levels of difficulty (5 and 10 hue steps distance between colors within a display) will be considered in order to keep this aspect comparable to Kantorowitz and Cohen (1977). The results were approximately the same as for the whole set of items since the lowest level of difficulty contributed little to the variance. Results are shown in Table 4. This table also presents the correlations with the multiple-choice vocabulary test (MWT). Correlations with drug dose were insignificant throughout ($-0.24 \leq r(14) \leq 0.37$). The correlations of verbal intelligence with the dependent variables from the

Table 4. Correlations of communication accuracy, response latency and utterance length with verbal intelligence and Brief Psychiatric Rating Scale (schizophrenics only)

	Verbal intelligence (MWT)	Total scores (BPRS)	Anxiety/ depression (BPRS)	Anergia (BPRS)	Thought disturbance (BPRS)	Activation (BPRS)	Hostile-suspiciousness (BPRS)
Communication accuracy							
Simultaneous mode	−0.08	−0.64**	−0.22	−0.57*	−0.44	−0.22	−0.53*
Successive mode	0.09	−0.10	−0.09	−0.12	0.02	0.12	−0.36
Response latency							
Simultaneous mode	0.02	−0.03	0.26	−0.29	−0.06	0.11	−0.23
Successive mode	−0.18	−0.16	−0.32	−0.02	0.21	0.02	−0.23
Utterance length							
Simultaneous mode	−0.24	−0.56*	−0.06	−0.52*	−0.31	−0.15	−0.70**
Successive mode	0.02	−0.47	−0.17	−0.49	−0.12	−0.27	−0.41

* $P < 0.05$
** $P < 0.01$

communication task and with the BPRS scales were negligible ($-0.24 \leq r(14) \leq 0.09$). Partialling out the MWT-score did not affect the level of significance for any of the original correlations between BPRS-scores and dependent variables from this experiment. Only in the simultaneous mode of presentation was communication accuracy significantly related to total BPRS score ($r(14) \leq -0.64, P < 0.01$) and to the subscales Anergia ($r(14) = -0.57$, $P < 0.05$) and Hostile-Suspiciousness ($r(14) = -0.53$, $P < 0.05$). For the successive mode of presentation the corresponding correlations were $-0.36 \leq r(14) \leq 0.12$, $P > 0.10$. The same pattern of correlations emerged for utterance length, although the difference between the two modes of presentation was reduced. For the simultaneous mode of presentation, utterance length correlated with BPRS total score $r(14) = -0.56$, $P < 0.05$, with Anergia $r(14) = -0.52$, $P < 0.05$, and with Hostile-Suspiciousness $r(14) = 0.70$, $P < 0.01$. The correlations for the successive mode of presentation were $r(14) = -0.47$ with the total score, $r(14) = -0.49$ with Anergia and $r(14) = -0.41$ with Hostile-Suspiciousness ($P < 0.10$).

Communication accuracy and utterance length showed some relationship ($r(14) = 0.45$, $P < 0.10$) for the simultaneous, but not for the successive ($r(14) = 0.08$) mode of presentation. The correlation pattern for difference-scores between the easiest and most difficult items was approximately the same as that for the overall-scores, probably due to the increase in variance with level of difficulty (see Table 2). The correlations of both these dependent variables with the other subscales, as well as all the correlations of response latency with any of the other scales, were not significantly different from zero. Similar to communication accuracy and utterance length, the number of descriptions which included references to both colors of a display correlated negatively with BPRS total score ($r(14) = -0.60$, $P < 0.05$), as well as with the subscales Anergia ($r(14) = -0.57$, $P < 0.05$) and Hostile-Suspiciousness ($r(14) = -0.66$, $P < 0.01$) for the simultaneous mode of presentation. The correlations were insignificant for the successive mode of presentation.

Discussion

Both the schizophrenics and the alcoholics show a decrease in communication accuracy and an increase in response latency and utterance length as the similarity between referent and nonreferent color in the display is increased. If one accepts such an increase in response latency and utterance length across levels of difficulty as indicating the amount of self-editing activity (Cohen 1978b), our group of schizophrenics is obviously rather different from the chronic schizophrenics tested by Kantorowitz and Cohen (1977) and more like the acute first-admission schizophrenics from the study by Cohen et al. (1974).

It is unlikely that the difference between our patients and those of Kantorowitz and Cohen (KC) is merely an effect of neuroleptic medication. All the KC-patients and 13 of our 16 schizophrenics were on maintenance doses of neuroleptics, while all the acute patients of Cohen et al. (CNR) were kept drug-free. If medication contributed to the difference, it is more likely to be due to a negative selection of

patients rather than their response to neuroleptics together with years of hospitalization. Furthermore, none of our dependent variables significantly correlated with dose of medication.

We also consider it unlikely that the difference is as a result of there being more process schizophrenics in the KC-study and more reactive schizophrenics in our study: there was an equal number of process and reactive schizophrenics in the KC-study and none of the differences proved to be significant, though the reactive patients tended to show at least some increase in response latency and utterance length across levels of difficulty. As there is no adaptation of the Phillips Premorbid Adjustment Scale to German conditions, it is impossible to compare the two samples directly. But if one takes into account that marital status is highly correlated with the Phillips scale (Kokes et al. 1977) and that 15 of our 16 schizophrenics have never been married, there is no reason to assume that the majority of our patients were of the reactive type.

The same problems arise in comparing the samples with respect to the proportion of paranoid schizophrenics. As in the CNR-study, our patients have been selected for not showing predominantly paranoid symptoms within the last weeks, while half of the long-term patients in the KC-study had manifest paranoid disturbances. Since paranoid schizophrenics are rehospitalized less frequently (Strauss et al. 1974), and the paranoid symptoms seem to be inversely related to duration of illness (Depue and Woodburn 1975), the dichotomy of paranoid versus nonparanoid schizophrenia has to be seen in close connection with length of hospitalization. It is this variable which shows the most obvious difference between the studies: The mean length of hospitalization in the KC-study was 8 years with a range from 3.0 to 28.5 years. In our study it was only 2.4 years with a range from 10 months to approximately 6 years. It is primarily the difference in length of hospitalization and those variables intimately related to it (Wing and Brown 1970) which may have made our subjects appear more similar to the acute drug-free first admissions than to the chronic long-term patients in the KC-study.

Unfortunately, it is not possible to give a more direct account of the number of patients that behaved according to the 'Perseverative-Chaining-Model' because the 'perseverative sampling', as well as the shift in association, are considered implicit processes often occurring before a response is emitted (Cohen 1978a). Even though we aimed to select nonparanoid process schizophrenics, it might well be that the shorter duration of hospitalization in our sample led to a more heterogeneous group of patients, including a higher number of patients responsive to neuroleptic medication. In the KC-study, the random sample with an average of 8 years in institutions might have resulted in a much more homogeneous group "prone to seek or drift into settings that are so routinized that ambiguous referents are rarely encountered... (and) in which dominant responses are rarely inappropriate and hence little or no self-editing is required of speakers" (Kantorowitz and Cohen 1977, p 8). By contrast, our patients appeared, on average, to be highly engaged in self-editing, as indicated by the slopes of response latency and utterance length, and clearly had a sufficiently wide range of attention (Venables 1964) to take into account the nonreferent when describing the referent of an item.

Perhaps it is just this relative heterogeneity of our sample which led to a number of highly significant correlations between different kinds of psychopathology and

the dependent variables from the communication task. There are two groups of schizophrenics that mainly contribute to the significant correlation of the BPRS total score with communication accuracy and utterance length. On the one hand, it is the schizophrenics high in Anergia with social withdrawal, motor retardation, incoherence and flat, incongruous affect, representing the Disorganized Type of schizophrenia, who give relatively short descriptions and are low in communication accuracy. On the other hand, it is the group high in Hostile-Suspiciousness that show about the same patterns of responses. The latter finding corresponds well with Kantorowitz and Cohen, who report that paranoid patients tend to respond only with relatively terse descriptions. Different symptoms apparently lead to the same impairment in communication accuracy, the two scales correlate ($r(14) = 0.22$).

All these correlations are only found for the simultaneous mode of presentation, which was the procedure of choice both in the CNR-study and the KC-study. For the successive mode of presentation no correlation reached an acceptable level of significance. As anticipated the amount of narrowing in attention—assumed to develop with length of illness in process nonparanoid schizophrenics (Broen, 1968)—might be overcome by urging the subject to attend to the nonreferent in a given display. It is unlikely that the difference in correlations is an artifact resulting from different levels of difficulty (Chapman and Chapman 1973), since mode of presentation did not have any significant effect on the average communication accuracy, response latency or utterance length. The lack of significant main effects might again be due to the relatively short duration of hospitalization in our sample. In contrast to the KC-study our patients did not describe the colors in line with the 'Impulsive Speaker Model'. Actually, the schizophrenics showed an even steeper slope of utterance length with increasing difficulty than did the alcoholics. We had assumed the diminished self-editing activity characteristic for 'Impulsive Speakers' prevailing among the chronic schizophrenics of the KC-study to be a possible side effect of excessive focusing of attention to the target stimulus. Obviously, our manipulation in the instructions was in fact helpful for the schizophrenics: Those schizophrenics who were required to name first the color of the nonreferent before being asked to describe the referent gave descriptions that referred to both colors in the display when they were later presented with both colors simultaneously. This effect was not found for the alcoholics, who did not refer to the nonreferent color more often after the successive mode of presentation than did the schizophrenics who were without this pretraining.

A rather disappointing and unexpected result is the poor discrimination between schizophrenics and alcoholics. Further studies are needed to elucidate whether this poor discrimination could have resulted from a floor effect. In view of the excellent discrimination with two-color displays in the CNR-study we used this format rather than three-color displays to avoid the overlap in colors between items from the KC-experiment.

All the studies of Cohen and co-workers and the experiments of Smith (1970) and of Davis and Blaney (1976) had shown the referent task to be a powerful instrument in differentiating various types of schizophrenics from normals. We know of only one short report (Flenning 1971) that compared schizophrenics with

nonpsychotic hospitalized patients. This study also failed to produce significant group differences. Considering that the referent communication experiments of Cohen (1978a) are based on one of the most elaborate models of thinking and communication in schizophrenic patients, and that it can easily incorporate a large body of research, such comparisons are long overdue. The lack of discrimination between our group of schizophrenics and alcoholics seems to indicate that not only the deficit of disorganized schizophrenics or the psychopathology of paranoid schizophrenics, but also the cognitive and motivational impairments of chronic alcoholics (Tarter 1976) might result in the same pattern of inefficient referent communication.

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