

Somatic Delusions in Schizophrenia and the Affective Psychoses

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Background. Delusions relating to the body, a ready source of information about the immediate experiences of psychotic patients, have not been systematically studied. We attempted an account of the phenomena, looking for differences between diagnostic groupings in the type and lateralisation of such phenomena, and for evidence of localisation.

Method. Somatic delusions elicited at interview with 550 Research Diagnostic Criteria-diagnosed psychotic patients were categorised according to content, and the results were compared across diagnostic groupings.

Results. Significant differences were demonstrated, both at the level of individual delusions and in the nature and overall pattern of such delusions. There were also differences between diagnostic groups in the choice of body parts involved. Among male patients there were significant differences in laterality between the groups, with schizophrenic subjects locating abnormal phenomena principally on the left and depressive subjects on the right. A provisional taxonomy of bodily delusions was developed.

Conclusion. Phenomenological differences between the psychoses were demonstrated and the results offer some support for current hypotheses of localisation of brain dysfunction in the psychotic illnesses.

Body-image disturbances in psychotic patients have not been extensively studied in any systematic manner. Angyal (1936) drew attention to certain similarities with parietal syndromes in the abnormal perceptions of 15 schizophrenic patients. Lukianowicz (1967) attempted a classification of body-image disturbances encountered in 50 patients with such varying diagnoses as 'neurosis', 'depression', schizophrenia, epilepsy, and migraine. He found four major categories – disturbances of shape, size, mass, and spatial position – with 16 subcategories overall, but he concluded that there were no significant differences, as was perhaps to be expected. Taylor & Fleming (1981) reported on the lateralisation of 'hypochondriacal delusions' in 27 schizophrenic patients. Only one of these studies attempts a systematic categorisation, and all involve relatively small numbers of subjects. A number of other studies make incidental mention of bodily delusions (Mintz & Alpert, 1972; Chapman *et al*, 1978; George & Neufeld, 1985).

We decided to conduct a systematic survey of the abnormal beliefs and experiences about the body reported by a large number of psychotic subjects. There were four main aims in doing so. The first was to record the extent and variation of such phenomena, which constitute evidence of primary disturbances of perceptual experience in psychotic illness, and which are also among the most

remarkable and fundamental disturbances associated with such illness. Secondly, we wished to attempt some categorisation of the phenomena which would enable us to determine whether there were differences in the pattern of these phenomena between diagnostic groups. Thirdly, we wished to see whether comparison with those abnormalities of body image, which are known to be associated with lesions in particular areas of the brain, would support current hypotheses of localisation of brain dysfunction in the psychotic illnesses. Finally, since such hypotheses have commonly involved lateralisation, we wished to see what evidence might be obtained from such a survey about the laterality of dysfunction in the psychoses.

Method

Notes relating to 550 (100 depressive, 100 manic, 100 chronic schizophrenic, and 250 acute schizophrenic) psychotic patients from among those interviewed by one of us (JC) over a period of 17 years (1973–90) were examined. These data were systematically collected in an attempt to record the range of psychotic phenomena present at the time of the interview. The diagnosis was established according to the Research Diagnostic Criteria (RDC) (Spitzer *et al*, 1975), and the interviews were conducted according to the guidelines of the Present State

Examination (Wing *et al.*, 1974). Wherever possible (92% of cases), all relevant material recorded in the case-notes before or after the date of the interview was also included in order to maximise the range of delusions. In the remaining 8% of cases, only the original interview notes were available.

As one of the purposes of the study was to examine whether different sorts of delusion were linked to different diagnostic categories, no diagnosis was made solely on the basis of delusional criteria. Specifically, as the RDC for definite schizophrenia require two of nine phenomena or sets of phenomena (four types of delusion, three types of hallucination, formal thought disorder, catatonia), only patients who had at least one of the five non-delusional criteria were included among the 350 schizophrenic patients. Patients who fulfilled RDC for mania or definite major depression, and who had either hallucinations or delusions, were allocated to manic and psychotic depressive groups regardless of the type of delusion present. Chronic schizophrenic patients were those whose florid psychotic state had persisted for two years or more despite, in almost all cases, the administration of neuroleptics throughout.

In all, there were 304 male and 246 female subjects: 39 male and 61 female depressive subjects, 51 male and 49 female manic subjects, 70 male and 30 female chronic schizophrenic subjects, and 144 male and 106 female acute schizophrenic subjects. All recorded references to beliefs or experiences involving the subject's body were transcribed verbatim. Each of us then independently allocated these references to categories according to similarities in content, without previous consultation as to the nature or number of such categories. Some of the references were assigned to more than one category. Two references (both by acute schizophrenic subjects) were deemed incomprehensible and defied categorisation.

Results

The two initial lists of categories independently generated were very similar both in number (approximately 40 each) and in nature. A total of 31 categories either matched exactly or represented subdivisions of matching categories (e.g. one of us distinguished a category of 'burning' from that of 'temperature'). After the lists were compared, the categories were further refined. In particular, any preliminary category which contained fewer than four instances was eliminated. This resulted in a list of 37 categories, as shown, together with examples, in Table 1.

We distinguished between two broad types of delusions. On the one hand, there were those representing a (to some degree) elaborated belief about the body. This belief may have been inferred from experienced sensations, but did not simply describe those sensations. These we called the 'cognitive' group; they correspond most closely to the classical idea of delusion. On the other hand, there were those constituting direct, or almost direct, reports of sensory experience. These, which approximate to somatic hallucinations, we called the 'perceptual' group. Because of the immediacy of bodily experience, the distinction between delusions and hallucinations was especially problematic in this area. Nonetheless, we felt that the conventional distinction between reported phenomena which are likely to represent perceptual disturbances and those in which disturbances of cognition are more likely to play a part was worth preserving. We are aware that there are many other ways in which delusions may be classified. Most of these depend on form rather than content, our primary concern in this paper.

There were 250 acute schizophrenic patients in our study, compared with 100 in each of the other diagnostic groups. Therefore, wherever comparison across diagnostic groups was made, we gave for acute schizophrenia both the absolute number, *n*, of occurrences and, in parentheses following it, an adjusted figure ($n' = n/2.5$), in order to make the figures comparable.

Abnormal beliefs about the body were recorded in 303 cases (55%). The highest percentage was in the schizophrenic group (chronic schizophrenia 68%, acute schizophrenia 60%) and the lowest in the manic group (35%), with depressive subjects lying between (50%). Acute schizophrenic subjects had the most complaints per person and were the most likely to have particularly numerous bodily delusions.

Breakdown by diagnosis: vertical

The breakdown of bodily delusions by diagnosis into the categories listed above is also shown in Table 1.

Among depressive subjects, 'cognitive' delusions suggesting a functional problem (*disease* (19), *malfunction of body part* (16)) were nearly twice as common as those suggesting something was wrong with the structure (*distortion of shape or colour* (9), *fragmentation* (8)). Of the 'perceptual' categories, the commonest were feelings of *blockage* (6) or of *pressure* (5).

Among manic subjects, the commonest category of 'cognitive' delusion was that of *pregnancy* (9). The

Table 1
Categories of delusions

| Category | Example | Total (n=550) | D (n=100) | M (n=100) | CS (n=100) | AS n' (n=250) | P value | | | | |
|------------------------------------|---|------------------|--------------|--------------|---------------|------------------|----------|-------------------------------|-------------------|-----------|---------------|
| | | | | | | | Four-way | SZ/MDP (CS + AS/ D + M) | CS/AS | D/M | |
| <i>'Cognitive' group</i> | | | | | | | | | | | |
| Penetration/ ingestion | Knife in back, fingers went through me, inhaled seaweed and fungus | 71 | 0 | 7 | 16 | 19.2 | 48 | <0.00001 ***** | <0.00001 ***** | — | 0.007 ** |
| Disease | Had cancer, brain haemorrhage | 58 | 19 | 7 | 10 | 8.8 | 22 | 0.02 * | — | — | 0.01 * |
| Distortion of shape (colour) | Face in forehead, right leg longer, skin yellow | 54 | 8 | 2 | 7 | 12.4 | 31 | 0.05 * | 0.05 * | — | — |
| Passivity | Someone knocking me, people interfering with sight, nailed to bed | 44 | 3 | 1 | 14 | 10.4 | 26 | 0.0007 *** | 0.00009 **** | — | — |
| Absence of body part | No rectum, half spleen missing | 40 | 4 | 2 | 13 | 8.4 | 21 | 0.01 ** | 0.003 ** | — | — |
| Metal/implant | Piece of metal in leg, transmitter in ear, piece of glass in brain | 38 | 1 | 1 | 12 | 9.6 | 24 | 0.0005 *** | 0.00004 **** | — | — |
| Fragmentation | Body cut up, rotting, head blown off, leg melting, body eaten by worms | 37 | 8 | 1 | 5 | 9.2 | 23 | 0.04 * | — | — | 0.02 * |
| Malfunction of body part | Heart not working, breathing breakdown | 32 | 16 | 2 | 4 | 4 | 10 | 0.00003 **** | 0.015 * | — | 0.0005 *** |
| Electricity/ radiation | Electricity running through me, blast of radiation to left hand, magnetic force travelling in legs | 24 | 0 | 3 | 7 | 5.6 | 14 | 0.05 * | 0.01 ** | — | — |
| Pregnancy | Pregnant by self- fertilisation, having Devil's baby | 24 | 2 | 9 | 7 | 2.4 | 6 | 0.01 ** | — | 0.04 * | 0.02 * |
| Change of sex | Changing into woman and having baby, hermaphrodite with penis tucked behind two flaps of skin on abdominal wall | 20 | 1 | 1 | 4 | 5.6 | 14 | — | 0.01 ** | — | — |
| Infestation | Worms in stomach, termites in leg, weeds in gullet | 18 | 4 | 2 | 3 | 3.6 | 9 | — | — | — | — |
| Emanation | White fumes coming out of penis, gel oozing from fingers | 17 | 3 | 0 | 4 | 4 | 10 | — | — | — | — |
| Ownership disturbance | Body under someone else's control, eyes not under my control, someone else talking with my voice | 15 | 1 | 0 | 3 | 4.4 | 11 | — | 0.01 ** | — | — |

Table1 (continued)

| Category | Example | Total (n = 550) | D (n = 100) | M (n = 100) | CS (n = 100) | AS n' (n = 250) | P value | | | | |
|----------------------------|--|--------------------|----------------|----------------|-----------------|--------------------|----------|-------------------------------|---------|--------|--------|
| | | | | | | | Four-way | SZ/MDP (CS + AS/ D + M) | CS/AS | D/M | |
| Displacement of body part | Stomach fallen down, brain slipped over to right | 14 | 3 | 0 | 6 | 2 | 5 | 0.05* | — | — | — |
| Sexual interference | People having sex with me while walking, Mark Phillips touched my breast | 14 | 0 | 3 | 7 | 1.6 | 4 | 0.009** | — | 0.01** | — |
| Smell/dirtiness | Body smells horrible, right hand unclean, eyebrows stink | 12 | 6 | 0 | 3 | 1.2 | 3 | 0.01** | — | — | 0.01** |
| Loss of boundary | Other bodies intermingled with mine, friend's body erupting through mine, hand placed on leg melts into it | 8 | 0 | 0 | 0 | 3.2 | 8 | 0.02* | 0.03* | — | — |
| Non-belonging of body part | Neck not my own, genitals removed and someone else's stitched on, top half of body does not belong to legs | 6 | 1 | 1 | 1 | 1.2 | 3 | — | — | — | — |
| Damage to body part | Vagina damaged by injection, hole torn in throat | 6 | 3 | 0 | 3 | 0 | 0 | 0.01** | — | 0.02* | — |
| Mirror | Face in mirror not mine, face in mirror looks strange | 5 | 0 | 0 | 1 | 1.6 | 4 | — | — | — | — |
| Autoscopy | Standing outside myself looking at myself, can see inside myself from a height | 5 | 0 | 0 | 0 | 2 | 5 | — | — | — | — |
| <i>'Perceptual' group</i> | | | | | | | | | | | |
| Shrinking/enlarging | Shrunk into little boy, arms getting longer | 27 | 2 | 1 | 4 | 8 | 20 | 0.01** | 0.005** | — | — |
| Pain/weakness | Burning pain in neck, no strength in arms | 24 | 4 | 2 | 1 | 6.8 | 17 | 0.05* | — | 0.02* | — |
| Being cut/injected | Nurse cut neck open, injection in eye | 20 | 1 | 1 | 3 | 6 | 15 | 0.04* | 0.004** | — | — |
| Flowing | Electricity pulses in arm, water rushing through veins | 20 | 0 | 5 | 5 | 4 | 10 | — | — | — | — |
| 'Peculiar' sensation | Legs feel odd, strange feeling in ear | 19 | 0 | 1 | 5 | 5.2 | 13 | 0.04* | 0.004** | — | — |
| Fullness/emptiness | Body completely filled with gas, right side of body empty | 19 | 3 | 0 | 4 | 4.8 | 12 | — | 0.05* | — | — |
| Being struck | Whacks on back, getting a hiding | 15 | 0 | 0 | 1 | 5.6 | 14 | 0.02* | 0.003** | 0.04* | — |

Table 1 (continued)

| Category | Example | Total (n=550) | D (n=100) | M (n=100) | CS (n=100) | AS (n=250) | P value | | | | |
|---------------------------|--|------------------|--------------|--------------|---------------|---------------|----------|---------------------------|-----------|-----------|------------|
| | | | | | | | Four-way | SZ/MDP (CS+AS/ D+M) | CS/AS | D/M | |
| Burning | Radiation burning me, charred my left hand, hair burnt off | 12 | 0 | 3 | 4 | 2 | 5 | – | – | – | – |
| Heat/cold | Head red-hot all over, lost body heat | 11 | 0 | 3 | 2 | 2.4 | 6 | – | – | – | – |
| Pressure | Pressure in head, skull feels like exploding | 10 | 5 | 2 | 0 | 1.2 | 3 | 0.04 * | 0.02 * | – | – |
| Weight | Face feels light, eyes heavy | 9 | 2 | 0 | 2 | 2 | 5 | – | – | – | – |
| Blockage | Gullet blocked by seed, blood clotted in veins | 9 | 6 | 0 | 1 | 0.8 | 2 | 0.002 ** | 0.05 * | – | 0.01 ** |
| Rotation | Brain rotating, leg spinning round | 7 | 0 | 0 | 0 | 2.8 | 7 | 0.04 * | 0.04 * | – | – |
| Tingling/pins and needles | Tingling all over, pins and needles down whole left side | 6 | 0 | 0 | 0 | 2.4 | 6 | 0.04 * | – | – | – |
| Liquidity | Water in face, neck full of fluid | 4 | 1 | 0 | 3 | 0 | 0 | 0.02 * | – | 0.02 * | – |

D = depressive subjects, M = manic subjects, CS = chronic schizophrenic subjects, AS = acute schizophrenic subjects, SZ = combined schizophrenic subjects, MDP = manic depressive subjects, n = number of subjects, n' = n/2.5 = number of acute schizophrenic subjects adjusted for comparability (see text). Asterisks (*, **, etc) represent increasing levels of significance.

commonest 'perceptual' delusions were of *flowing* (5), *burning* (3), and *temperature* (3 – all hot or warm).

Among chronic schizophrenic subjects, the commonest 'cognitive' delusions were *penetration/ingestion* (16) *passivity* (14), *absence of body part* (13), and *metal/implant* (12). The second two delusions, expressing something amiss with the structure of the body, occurred nearly as often as the first two, which represent what might be thought of as core schizophrenic delusions.

Among acute schizophrenic subjects, easily the commonest delusions were those of *penetration/ingestion* (19.2). These were followed by *distortion of shape or colour* (13.2). Then closely followed *passivity* (10.4), *metal/implant* (9.6), *fragmentation*, (9.2), *disease* (8.8), and *absence of body part* (8.4). On the 'perceptual' side, certain sensations were particularly common: *shrinking/enlarging* (8), *pain/weakness* (6.8), *being cut/injected* (6), and *being struck* (5.6). As with the chronic schizophrenic subjects, there was a significant group of 'peculiar' sensations (5.2).

Breakdown by diagnosis: horizontal

When we viewed the data as a whole, there were significant differences from the expected distribution over all four diagnostic groups in 25 out of the 37 categories, and these are shown in Table 1 ('P value', column 1).

Additionally, certain categories of delusion were significantly positively associated with each diagnosis when that diagnosis was compared with all other diagnoses:

(a) depression

- (i) (cognitive) *malfunction of body part* ($P < 0.00001$), *disease* ($P = 0.002$), and *smell/dirtiness* ($P = 0.01$)
- (ii) (perceptual) *blockage* ($P = 0.001$) and *pressure* ($P = 0.008$)

(b) mania (cognitive) *pregnancy* ($P = 0.02$)

(c) chronic schizophrenia

- (i) (cognitive) *sexual interference* ($P = 0.002$), *absence of body part* ($P = 0.01$), *passivity*

- ($P=0.01$), *displacement of body part* ($P=0.02$), and *metal/ implant* ($P=0.02$)
- (ii) (perceptual) *liquidity* ($P=0.02$)
- (d) acute schizophrenia
- (i) (cognitive) *penetration/ingestion* ($P=0.00006$), *loss of boundary* ($P=0.001$), *autoscopy* ($P=0.01$), *distortion of shape/colour* ($P=0.01$), *change of sex* ($P=0.02$), *metal/ implant* ($P=0.02$), *fragmentation* ($P=0.03$), *ownership disturbance* ($P=0.03$), and *passivity* ($P=0.05$).
- (ii) (perceptual) *being struck* ($P=0.001$), *being cut/injected* ($P=0.002$), *shrinking/enlarging* ($P=0.002$), *rotation* ($P=0.004$), *tingling/pins and needles* ($P=0.008$), *pain/weakness* ($P=0.01$), and *'peculiar' sensation* ($P=0.04$).

Some categories of 'cognitive' delusion appear to be characteristic of schizophrenic rather than affective illness (Table 1, 'P value', column 2). It is hardly surprising that these should include *passivity*, *penetration/ingestion*, *metal/implant*, and, to a lesser extent, *electricity/radiation* and *ownership disturbance*. Some are less predictable. *Absence of body part* significantly differentiated the two main groupings, being commoner in schizophrenic subjects, as was *distortion of shape/colour*. Eighteen of 20 occurrences of *change of sex* were among schizophrenic subjects; the relative frequency of this unusual complaint in schizophrenia has been noted previously (Gittleson & Levine, 1966). *Loss of boundary* ($n=8$) occurred in the schizophrenic group alone, as did the categories of *mirror* ($n=6$) and *autoscopy* ($n=5$), although the numbers in these last two cases were small and the difference did not reach significance ($P=0.06$ and $P=0.09$, respectively). One further distinction was noted. Of 11 subjects who stated specifically, not that the whole of a body part or organ was missing, but that *half or part* of it was missing, 10 were schizophrenic (the remaining subject was manic).

The 'perceptual' group was highly discriminatory. Feelings of *being cut/injected* were very common and, with one exception, confined to schizophrenic subjects, as were feelings of *being struck*. *Fullness/emptiness* and *shrinking/enlarging* were characteristic of schizophrenia. *Rotation* ($n=7$) was entirely confined to schizophrenia, as was *tingling/pins and needles* ($n=6$), although the numbers were small. In general, unspecified *'peculiar' sensations* were characteristic of the schizophrenic group. Feelings of explosion, shattering, or tearing, or of something sticky, shaky, loose or wobbly were described only by schizophrenic

subjects, but less than four times each, and were therefore not separately categorised.

Malfunction of body part together with sensations of *blockage* and *pressure*, all commonest in depressive subjects, distinguished the affective group from the schizophrenic.

There were a few categories which distinguished the chronic and acute subgroups of schizophrenia (Table 1, 'P value', column 3). *Autoscopy* and *loss of boundary* occurred only in the acute syndrome, but the numbers were small. *Sexual interference*, *pregnancy*, and *damage to body part* were significantly commoner in the chronic syndrome, as was *liquidity*, whereas *pain/weakness* and *being struck* were commoner in the acute syndrome.

Some of the differences were much greater than they appear by a purely quantitative analysis. For example, there were important qualitative differences between the distortions of shape reported by the schizophrenic group and those reported by the affective group, especially by the depressive subjects. First, there was the bizarre nature of many schizophrenic delusions (e.g. 'there's an arm sticking out of my chest', 'my mouth is where my hair should be', 'my penis is turned inside out'). A second related distinctive characteristic was the 'disjunctiveness' of some schizophrenic delusions. All cases among the affective subjects could be accounted for by a continuous or 'smooth' distortion (of the kind that is produced by stretching), whereas many of the delusions of the schizophrenic subjects contained references to complete restructuring of parts of the body. Some have been quoted above, but other characteristic changes involved parts being mutilated or amputated, and inexplicable dislocations or hiatuses ('there's a long gap in my throat', 'part of my spine is missing'); two subjects complained specifically of altered structure (something 'structurally wrong' with the abdomen, changed 'facial structure'). Nonetheless, continuous distortions, such as shrinking and enlarging (see above), were still commoner. Third, there was the specificity of schizophrenic delusions: virtually all depressive delusions involved the face, head, or hands becoming 'odd-looking'; in some unspecified way, altered or distorted, occasionally swollen or shrunken. A fourth characteristic of the distortions of body shape among schizophrenic subjects was asymmetry: legs, arms, breasts, and parts of the face could all be experienced as bigger or more prominent on one side (in all cases but one, the left side), and some subjects complained of being diffusely 'lop-sided' (see below).

Table 2
Body parts and functions

| Body part | D | M | CS | AS | Total | P value | | |
|----------------------|-----------|-----------|-----------|-------|-----------|-----------|----------|---------------------------|
| | (n = 100) | (n = 100) | (n = 100) | n' | (n = 250) | (n = 550) | Four-way | SZ/MDP (CS + AS/D + M) |
| <i>Body part</i> | | | | | | | | |
| Brain | 6 | 6 | 11 | 20 | 50 | 73 | 0.0002 | 0.001 |
| Head | 10 | 3 | 14 | 16.8 | 42 | 69 | 0.004 | 0.001 |
| Arm | 4 | 7 | 11 | 14 | 35 | 57 | 0.02 | 0.04 |
| Leg | 2 | 4 | 7 | 15.6 | 39 | 52 | 0.00008 | 0.00009 |
| Eye | 6 | 3 | 12 | 6.8 | 17 | 38 | — | — |
| Face | 3 | 3 | 5 | 9.2 | 23 | 34 | 0.05 | 0.02 |
| Mouth | 6 | 0 | 10 | 6 | 15 | 31 | 0.02 | 0.04 |
| Genitals | 3 | 0 | 5 | 7.2 | 18 | 26 | 0.02 | 0.007 |
| Heart | 3 | 2 | 6 | 5.2 | 13 | 24 | — | — |
| Skin | 0 | 1 | 5 | 6 | 15 | 21 | 0.02 | 0.002 |
| Bowels/ rectum | 9 | 0 | 5 | 2 | 5 | 19 | 0.001 | — |
| Trunk/chest | 1 | 3 | 3 | 4.8 | 12 | 19 | — | — |
| Bone/spine | 0 | 0 | 4 | 5.6 | 14 | 18 | 0.01 | 0.01 |
| Hair | 1 | 3 | 2 | 4.4 | 11 | 17 | — | — |
| Blood | 0 | 0 | 2 | 6 | 15 | 17 | 0.003 | 0.001 |
| Stomach/ gullet | 3 | 0 | 2 | 3.6 | 9 | 14 | — | — |
| Ear | 1 | 1 | 2 | 3.6 | 9 | 13 | — | — |
| Neck | 2 | 1 | 2 | 2 | 5 | 10 | — | — |
| Back | 0 | 0 | 1 | 3.2 | 8 | 9 | — | — |
| Throat | 2 | 0 | 2 | 1.6 | 4 | 8 | — | — |
| Belly | 0 | 2 | 1 | 1.6 | 4 | 7 | — | — |
| Breast | 0 | 0 | 1 | 2 | 5 | 6 | — | — |
| Buttocks | 0 | 0 | 0 | 1.6 | 4 | 4 | — | — |
| Nose | 0 | 2 | 2 | 0 | 0 | 4 | — | — |
| Vein | 0 | 1 | 1 | 0.8 | 2 | 4 | — | — |
| Uterus/ cervix | 1 | 0 | 2 | 0.4 | 1 | 4 | — | — |
| Lung | 1 | 0 | 1 | 0.4 | 1 | 3 | — | — |
| Liver | 0 | 0 | 1 | 0.8 | 2 | 3 | — | — |
| Nerve | 0 | 0 | 2 | 0.4 | 1 | 3 | — | — |
| Muscle | 0 | 0 | 0 | 0.8 | 2 | 2 | — | — |
| Thyroid | 0 | 0 | 1 | 0.4 | 1 | 2 | — | — |
| 'Insides' | 0 | 0 | 0 | 0.8 | 2 | 2 | — | — |
| Bladder | 1 | 0 | 0 | 0 | 0 | 1 | — | — |
| Spleen | 0 | 0 | 0 | 0.4 | 1 | 1 | — | — |
| Ovary | 0 | 0 | 1 | 0 | 0 | 1 | — | — |
| Artery | 0 | 0 | 1 | 0 | 0 | 1 | — | — |
| Membrane | 0 | 0 | 0 | 0.4 | 1 | 1 | — | — |
| 'Tissue' | 0 | 0 | 0 | 0.4 | 1 | 1 | — | — |
| 'Gland' | 0 | 0 | 0 | 0.4 | 1 | 1 | — | — |
| 'Organ' | 0 | 0 | 0 | 0.4 | 1 | 1 | — | — |
| All parts | 65 | 42 | 125 | 155.6 | 389 | 621 | | |
| <i>Body function</i> | | | | | | | | |
| Breathing | 2 | 0 | 1 | 0.8 | 2 | 5 | — | — |
| Circulation | 2 | 0 | 1 | 0 | 0 | 3 | — | — |
| Seeing | 3 | 0 | 0 | 0 | 0 | 3 | 0.003 | 0.02 |
| Hearing | 3 | 0 | 0 | 0 | 0 | 3 | 0.003 | 0.02 |
| Eating/ drinking | 2 | 0 | 0 | 0 | 0 | 2 | 0.03 | — |
| Urinating | 0 | 0 | 0 | 0.4 | 1 | 1 | — | — |
| All functions | 12 | 0 | 2 | 1.2 | 3 | 17 | <0.00001 | 0.02 |

D = depressive subjects, M = manic subjects, CS = chronic schizophrenic subjects, AS = acute schizophrenic subjects, SZ = combined schizophrenic subjects, MDP = manic depressive subjects, n = number of subjects, n' = n/2.5 = number of acute schizophrenic subjects, adjusted for comparability (see text).

Choice of body parts

There were substantive differences between the diagnostic groups in the part of the body which became the subject of delusional belief. Table 2 shows the parts that were specified, together with their frequency of occurrence, broken down by diagnosis.

There were apparently numerous differences between diagnostic groups in the frequency with which many body parts were mentioned. However, these effects were to some degree confounded by the tendency for schizophrenic subjects to be more specific, so that all body parts were likely to be cited more often by them. Thus, the fact that this trend was *not* seen with *heart* and *eye* suggests that these body parts were relatively more favoured by affective subjects.

In general, references to the *brain* or *head* were the commonest, and possibly a degree of insight was responsible for this. Among *depressive* subjects, the next most common body part after *head* ($n = 10$, 15.4%), and even commoner than *brain* ($n = 6$, 9.2%), was *bowels/rectum* ($n = 9$, 13.9%). In *manic* patients, the commonest reference was to *arm* ($n = 7$, 16%), largely because of the prominence of delusions concerning the hand, and then *brain* ($n = 6$, 14.3%) and *leg* ($n = 4$, 9.5%). References to the *brain* by *acute schizophrenic* subjects were by a large margin the most frequent of references by any group to any body part ($n = 50$, $n' = 20$, 13.0%) (the next commonest were references, also by acute schizophrenic subjects, to the *head* ($n = 42$, $n' = 16.8$, 10.9%)). The pattern for *chronic schizophrenic* subjects, here as elsewhere, lay between the depressive and acute schizophrenic subjects.

Many body parts were mentioned only by schizophrenic subjects. These fell into three groups.

First, there was the group of internal organs: *liver*, *spleen*, *thyroid*, and *ovary*. These are organs which normally give rise to no sensations and have no emotive significance. They are in this sense 'technical' or 'mechanical' references. By contrast, the internal organs mentioned by the affective group were *brain*, *heart*, *lung*, *stomach*, *bowels*, *bladder*, and *uterus*. These are all organs whose workings are the object of direct and daily experience, which give rise to sensations, and which are, with the possible exception of the *bladder*, organs of broader (more than medical) significance. To refer to them is to connote as well as to denote.

Second, there was a group of surface body regions: *back*, *breast*, and *buttocks*. It could be argued that these are less well integrated into our sense of ourselves than *trunk/chest* and *belly*, and all the

other surface body parts which were mentioned by all diagnostic groups: *head*, *neck*, *throat*, *face*, *nose*, *ear*, *eye*, *mouth*, *arm*, *leg*, and *genitals*.

Third, there was a group of generic body components which are neither specific areas nor defined organs in the accepted sense: *nerve*, *muscle*, *artery*, *membrane*, *bone*, *blood*, and the vague 'tissue', 'gland', and 'organ'. Affective subjects mentioned *hair*, *skin*, and *vein*, although *skin* and *vein* were both mentioned more frequently by schizophrenic subjects. But even these are more immediate objects of sensory experience, if only in the sense of direct visual inspection, than the rest.

By comparison with the number of references to body parts themselves, positive references to the functions of those parts (e.g. 'I don't seem to breathe anymore' rather than 'no lungs left') were infrequent (Table 2), but there was an evident preponderance of concern with the function, rather than the structure, of the body among depressive subjects ($P \leq 0.00001$).

Clearly, the parts of the body specified in the above schema are to some extent arbitrary. In particular, there are four body 'zones' where references could have been further subcategorised: *face* (cheek, eyebrow, and eyelid), *mouth* (jaw, lips, teeth, and tongue), *arm* (shoulder, elbow, hand, palm, finger, and fingernail), and *leg* (hip, thigh, knee, ankle, foot, heel, toe, and toenail). However, both the extent and the quality of such particularisation differed between diagnostic groups. In the *depressive* group, out of a total of 14 references to *face*, *mouth*, *arm*, and *leg*, five were in this sense 'particular' (35.7%); in the *manic* group, again out of a total of 14 references, no fewer than 10 were 'particular' (71.4%).

The schizophrenic subjects in general lay somewhere between (chronic schizophrenic subjects (57.1%), acute schizophrenic subjects (52.7%)). 'Particular' references tended in all groups to follow a broadly predictable pattern, so that, for example, the hand, followed by the finger, was the most common body part included in the *arm* category. However, the particularity of many references by the schizophrenic subjects differed in quality. Partly this was the degree of specificity. All references to the eyebrow, eyelid, elbow, heel, palm, fingernail, toenail, jaw, and (except for one depressive subject) teeth were by schizophrenic subjects. In some cases, the references were more specific still; for example, references to the left lower eyelid, 'right lower tooth'. By contrast, apart from the single reference by a depressive subject to a tooth alluded to above, the only specific parts mentioned by the affective group were cheek, shoulder, hand, finger, and tongue. Thus, in addition to specificity, the contrast involves

the degree to which such body parts are affectively integrated into our idea of ourselves, rather than being (however indispensable) more remote or 'mechanical' constituents.

Laterality and sex

There were differences between the diagnostic groups relating to those delusions or phenomena which are lateralised to one side of the body.

In general, asymmetry was much commoner in the schizophrenic than in the affective subjects (Table 3). An unspecified 'lopsidedness' was described by 20 (8) acute and two chronic schizophrenic subjects, but not by any of the manic or depressive subjects ($P=0.0002$). Furthermore, where a side was specified, there were clear differences: depressive subjects tended to describe phenomena on the right and schizophrenic subjects phenomena on the left ($P=0.0001$). If schizophrenic subjects as a whole are compared with affective subjects as a whole, the laterality affect remains as strong ($P=0.00009$). There was no effect of handedness on the laterality of phenomena, possibly because the number of left-handers was small.

It is also worth noting the content of lateralised delusions. All six lateralised depressive delusions referred to the head or mind, to a sense of asymmetry located in the conscious process itself: 'brain slipped over to the right', 'something wrong with the right side of head', 'mind not working on right side', 'pressure in right side of head', 'something wrong with right ear', 'right field of vision contracted in'. By contrast, almost all of the 81 lateralised schizophrenic delusions tended to concern the externalised body image: e.g. 'hypodermic in left

buttock'. Only six were comparable with the depressive delusions quoted – 'pressure over left side of head', 'things look odd in left visual field', 'thoughts positioned over left shoulder, connected to brain by strand' (cf. 'brain slipped over the right' above) – forming almost exact parallels to the depressive delusions, only on the left side. Interestingly, one subject complained that the 'left side of the brain connects with the right side'; another that he got a right-sided headache when depressed and a left-sided headache when 'thoughts are positive'; and the remaining subject that his head was 'fogged up on left, nothing on right'.

Of the limited number of cases where the right side was mentioned by schizophrenic subjects, five subjects appeared to report negative phenomena, rather than positive abnormalities: 'right side empty', 'absent right leg', 'right hand unclean, so became left handed', 'forgot to put arm on right side of chair', 'leaning over to right'.

The tendency to lateralise in general was much more marked in the male subjects. The two chronic schizophrenic subjects and 17 out of the 20 acute schizophrenic subjects who reported unspecified 'lopsidedness' were male ($P=0.0005$) (Table 3). The expected ratio, based on the actual numbers of subjects in each diagnostic group reporting bodily delusions, is given for comparison.

Was the laterality by diagnosis affect accounted for equally by both sexes or was it principally seen in one sex? In those cases where the side was specified (right, left, or both), the difference between diagnostic groups was highly significant for men ($P=0.0001$) but non-significant for women

Table 3
Laterality and sex

| Laterality | D | | | M | | | CS | | | AS | | |
|------------------------------------|------|---|-------|------|---|-------|------|---|-------|------|----|-------|
| | ♂ | ♀ | Total | ♂ | ♀ | Total | ♂ | ♀ | Total | ♂ | ♀ | Total |
| Right only | 5 | 1 | 6 | 0 | 3 | 3 | 0 | 0 | 0 | 4 | 4 | 8 |
| Left only | 0 | 0 | 0 | 3 | 1 | 4 | 9 | 3 | 12 | 22 | 9 | 31 |
| Right and left ¹ | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 | 6 | 0 | 6 |
| Unspecified | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 17 | 3 | 20 |
| Total | 5 | 1 | 6 | 3 | 4 | 7 | 13 | 4 | 17 | 49 | 16 | 65 |
| Ratio ♂:♀ | 5.00 | | | 0.75 | | | 3.25 | | | 3.06 | | |
| Expected ratio ♂:♀ ² | 0.56 | | | 0.83 | | | 2.09 | | | 1.44 | | |

1. Subjects who specified lateralised phenomena both on right and on left.

2. Based on the numbers of ♂ and ♀ subjects in that diagnostic group.

D = depressive subjects, M = manic subjects, CS = chronic schizophrenic subjects, AS = acute schizophrenic subjects, ♂ = male, ♀ = female.

($P=0.1$). When the diagnostic groups were aggregated as schizophrenic versus 'affective', the difference remained significant for men ($P=0.001$) but still did not achieve, although it approached, significance in women ($P=0.07$).

The male:female ratio in the whole study population was 1.24 (those with bodily delusions 1.26). However, in addition to *pregnancy* ($P<0.00001$) and *sexual interference* ($P=0.04$), *infestation* ($P=0.05$) was commoner in women, and *metal* ($P=0.05$) in men.

Analysis of the profile of variables

For each diagnostic group, each delusion was scored according to the percentage of occurrences accounted for by subjects in that diagnostic group. A rank order of delusions was derived from these percentages, ranging from the delusion for which the highest proportion (in some cases, 100%) was contributed by subjects within that diagnostic group, to that for which the lowest proportion (in some cases, 0%) was contributed. A series of overlay scatter-plots, to which lowest curves were fitted, was derived with SPSS (1992). In effect, these charts show a polarity between depression and acute schizophrenia. The rank orders of mania and chronic schizophrenia did not contribute significantly to the overall pattern. This is consonant with the finding (see above) that, when each diagnostic group was compared separately with the others combined, there were seven delusions which distinguished acute schizophrenia, and four which distinguished depression, at a level of $P<0.01$, but only one which distinguished chronic schizophrenia, and none which distinguished mania, at the same level.

Discussion

In keeping with previous findings, just over half of all subjects had bodily delusions (as defined for the purpose of this paper) (cf. Cutting, 1989b). Such delusions were commoner in schizophrenic than affective subjects, and in depressive than manic subjects. We aimed to classify the delusions and to look for differences between diagnostic categories. They can be usefully classified under 37 headings, most of which show significant differences between diagnostic groups. In general, there appeared to be a polarity between acute schizophrenic delusions on the one hand and depressive delusions on the other, chronic schizophrenic subjects having a pattern of delusions derived from both, and manic subjects having no discernible pattern in our study. Depressive delusions were more concerned with function, while

schizophrenic delusions were more concerned with structure. Depressive delusions were more comprehensible, more related to the whole, and more likely to have connotative or affect-laden meaning, while schizophrenic delusions were more bizarre, more specific, more detailed, and more technical.

However, the original 37 headings can be further grouped to form a provisional taxonomy of bodily delusions, and since this structure also shows the broad polarity referred to above, it suggests higher order distinctions among the main diagnostic categories. In the rank order of 'cognitive' delusions along the continuum from depression to acute schizophrenia, there appear to be four main groupings of types of delusion (Fig. 1).

The first group, at the extreme depression end of the continuum, involve degradation and deterioration of bodily functioning: *malfunction of body part*, *smell/dirtiness*, and *damage to body part*, together with *disease* and *infestation*.

The second group, positioned a little further along the continuum, involves distortion: *distortion of shape/colour* itself, with *displacement of body part* and *absence of body part*. *Pregnancy* falls at this point along the continuum and probably belongs here as a distortion, as does *change of sex*, but there is also overlap with the next group (which lies on the acute schizophrenia side of the midpoint of the continuum).

This third group is characterised by loss of control over one's own body: *emanation*, *penetration/ingestion*, *non-belonging of body part*, *ownership disturbance*, and *passivity*.

Finally, there is a group at the acute schizophrenia end which represents virtually complete breakdown of the ordinary subject/object distinctions which constitute our sense of identity as individuals distinct from the world. This can usefully be further divided, as it progresses along the continuum, into two subgroups: first that composed of *electricity/radiation* and *metal/implant*, in which the subject's own body appears as a separate, mechanical, and excessively objective entity, and then, at the extreme acute schizophrenia pole, the subgroup composed of *mirror* (in which the image of the self actually appears alien), *autoscopy* (in which the self stands outside itself and is able to inspect its own body as an alien object), and *loss of boundary* (in which the self ceases to be a recognisably distinct entity and inner and outer worlds merge).

If we look at these four main groups of delusions, it seems that the first two, which lie toward the depression end of the continuum, those of, broadly speaking, malfunction and distortion, represent failure of bodily integrity. The locus of concern lies

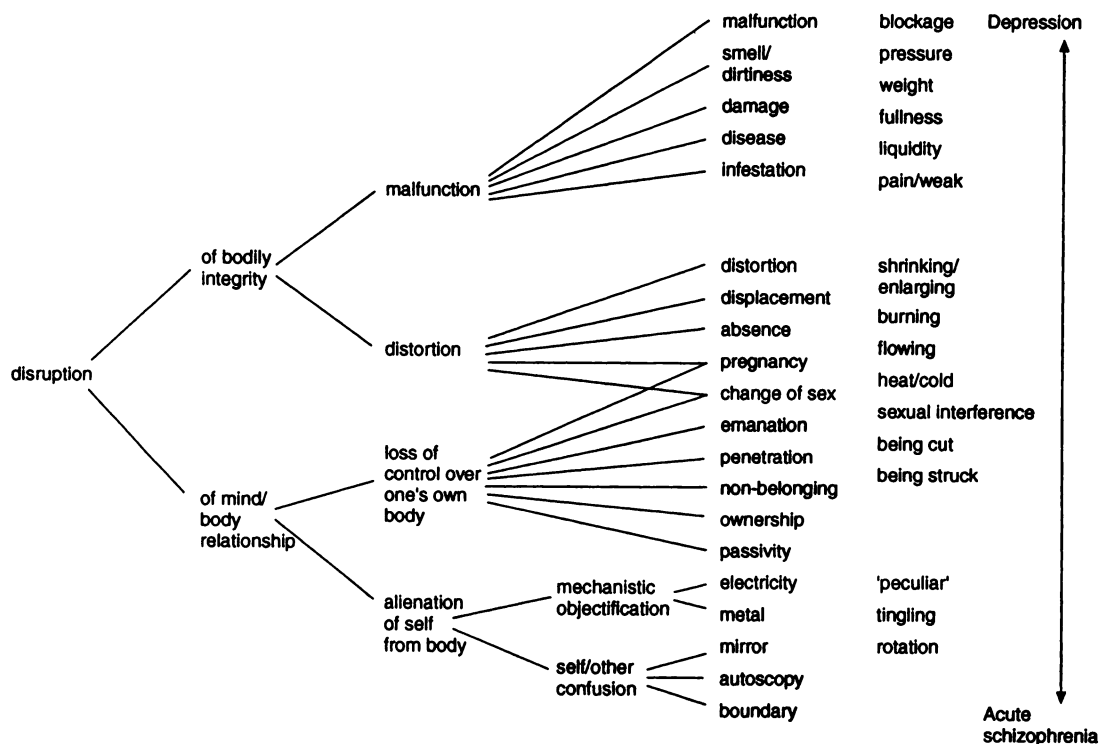


Fig. 1 Taxonomy of bodily delusions.

in the body itself, either in its function (at the extreme depression pole) or its structure (nearer the middle of the continuum). By contrast, the other two groups, which lie toward the acute schizophrenia pole, those of loss of control and subject/object breakdown, represent a failure of the very sense of the self. The locus of concern is not so much the body itself as the mind/body relationship on which the self is founded.

When we turn to the 'perceptual' delusions, we find some confirmation of this pattern. At the depression pole are those delusions which suggest malfunction or distortion: *blockage*, *pressure*, *weight*, *fullness/emptiness*, *liquidity*, and *pain/weakness*. By contrast, most instances of *burning* and *flowing*, as well as, to a lesser extent, *heat/cold*, were associated with beliefs in 'rays', 'electricity', or other alien forces influencing the person, and these, together with *shrinking/enlarging*, lie at the further end, forming a transition to the next group.

This group, exemplified by *sexual interference*, *being cut/injected*, and *being struck*, represents delusions of loss of control over one's own body.

Finally, at the acute schizophrenia pole are delusions of a 'peculiar' sensation, or, more specifically, *rotation* and *tingling/pins and needles*. Except perhaps in conjunction with the scattered instances of feelings of explosion, shattering, or tearing, or of something sticky, shaky, loose, or wobbly, which occurred only in acute schizophrenia, these delusions provide no particularly close parallel to the breakdown in sense of self to be found at this pole among the 'cognitive' delusions.

Two additional aims of this study were to look for evidence of localisation and lateralisation. Most of the 37 categories of delusion outlined do not have localising value. However, in a small group of delusions, there is some evidence that similar phenomena are seen in subjects with circumscribed cerebral lesions.

In his study of schizophrenia, Angyal (1936) had noted feelings of non-belonging, lightness, heaviness, growing, shrinking, emptiness, air passing through, being pushed or struck, impairment of unity or continuity of the body, displacement of body parts, and feeling of lifelessness of body parts, and

he attempted to link these phenomena with parietal syndromes. The subjective experience of alienation of a body part, a positive experience of strangeness as opposed to the negative experience of neglect, is seen in subjects with left hemiplegia (Cutting, 1989a). This experience has something in common with the experience of *non-belonging of body part*, although the range of affected parts is not stereotyped in psychotic patients. Patients with temporal lobe epilepsy experience visual distortions of size, known as dysmegalopsia, and Frederiks (1963) reported three epileptic patients who experienced their limbs as 'inflated', 'shortened', or 'extremely small'. Disjunctive experiences, in which parts of the body are missing, stuck on in the wrong place, or coming apart from one another, may be a reflection of a wider inability to integrate information into a coherent whole, and this failure, especially in relation to body parts, appears to be relatively common in subjects with right temporo-parietal lesions (Cutting, 1989b). Autoscopy, feelings of rotation, and tingling are all associated with temporal lobe seizures (Trimble, 1988), as are alterations in self-perception of sex or sexual orientation (Toone *et al*, 1982). Thus, on the face of it, there may be evidence that some of the phenomena reported by schizophrenic subjects in the form of bodily delusions have their origin in the temporoparietal region. However, the differences in quality between the phenomena in schizophrenia and the neuropsychological deficit syndromes consequent on relatively circumscribed lesions are important.

The highly significant effect of laterality reported above might suggest a right hemisphere abnormality in schizophrenia and an abnormality of function in the left hemisphere in depression. Taylor & Fleming (1981) also found a tendency for delusions to be lateralised in their group of 27 schizophrenic patients, with 15 left-sided, nine right-sided, and three patients bilateral overall. Interestingly, among the subgroup of right-handed males, the effect was much more marked (eight left, one right, and one bilateral), supporting our finding of an interaction between sex and laterality. In our study, in the few schizophrenic subjects in whom phenomena were lateralised to the right, these phenomena tended to be of a negative - vague or absent - kind, whereas they were of a positive - bizarre or distorted - kind on the left. This would

be consonant with a form of right-sided neglect, suggesting left-hemisphere hypofunction, coupled with an excessive and abnormal attention directed to the left side from a presumably dysfunctional right hemisphere. If there is a cerebral localisation for distortions of the body image, it may be that the site of origin lies in the right parietal lobe.

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