EXPERIMENTS IN PSYCHO-GALVANIC REACTIONS FROM CO-CONSCIOUS (SUB-CONSCIOUS) IDEAS IN A CASE OF MULTIPLE PERSONALITY

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THE following experiments were undertaken with the view of determining:—first, whether in the psycho-galvanic reaction of Tarchanoff we should be able to obtain physical corroboration of the evidence for co-conscious or split-off ideas; and, second, assuming such ideas to have been demonstrated by other methods, to what extent, if at all, they could affect the galvanic reactions to word-stimuli. The term “co-conscious” is used as equivalent to subconscious ideas actually present and functioning—*i.e.*, co-active ideas. As to the first object, it should be explained that, although a large and still accumulating mass of evidence has shown, under certain pathological and other conditions, the presence of co-conscious processes of which the subject is unaware and yet which manifest themselves through intelligent actions, still all writers are not in accord as to the interpretation which shall be put upon these manifestations. While we believe all students of abnormal psychology—those who have done the experimental work—are in agreement in interpreting subconscious manifestations as the expression of co-conscious ideas more or less dissociated from the personal consciousness—that is to say, they are agreed on the psychological interpretation—there are certain theoretical psychologists who still insist that all such subconscious manifestations are compatible with the interpretation that they are a result of physiological processes without any association with ideas whatsoever. This is the physiological interpretation.* It is therefore desirable to obtain evidence which will determine which of these two interpretations is correct. It seemed to us that Tarchanoff’s

* See Symposium on the Subconscious, JOURNAL OF ABNORMAL PSYCHOLOGY, April-May and June-July, 1907.

"Galvanic Reaction" might throw some light upon the interpretation of subconscious phenomena. It will be remembered that Tarchanoff, Veraguth, Jung and others have shown that when a weak electric current is passed through the body and, at a given moment, an emotional tone is evoked by arousing some idea that has an emotion associated with it, at that moment the electrical current becomes increased. This increase is due, probably, to a diminished resistance of the skin brought about by the emotion. Now, if a galvanometer is placed in the circuit and so arranged that a ray of light, falling upon the mirror of the galvanometer is reflected upon a scale, then with every increase of the current the light will travel along the scale. Accordingly, whenever, through a given stimulation, an emotional tone is aroused in the subject, there is an increase of electrical current and a movement of the light along a greater or less number of degrees upon the scale. By measuring these degrees of movement and plotting the oscillations upon a chart, a curve can be constructed, or, by the special contrivance of Jung, the oscillations of light can be recorded on a revolving drum (kymograph); this latter apparatus we used in our experiments. By using the well-known method of word stimulation, thus arousing various associated ideas with their emotions, a series of reactions can be obtained which record themselves through the oscillations of the light on the kymograph.

In the experimental work thus far done, whether by the galvanic method or the more common word-association tests, the reactions obtained have been, in certain cases, interpreted as due to subconscious ideas, but the term "subconscious" has been rather vaguely used. It has so many different meanings that it is difficult to make sure in what sense it is used by those who would explain certain psychological phenomena by it. In this account the term "subconscious" is used in the sense of "co-conscious" which is also employed as a synonym, meaning split-off, dissociated ideas of which the subject is usually not aware, *but which, nevertheless, are in activity at a given moment.* "Co-conscious" therefore implies doubling of consciousness.¹

¹ "Co-conscious" is not the equivalent of "unconscious" (das Unbewusste) as used by Freud, Jung, and others.

In previous experiments, too, it has been necessary to infer the presence of co-conscious (subconscious) ideas, (if that has been the interpretation), from the occurrence of the galvanic reaction or word association, and then to correlate the reaction with the inferred factor. It is desirable, therefore, that we should be able to have other evidence of the occurrence of both factors between which we seek a correlation, — between, in this case, “subconscious” processes (whether physiological or psychological) on the one hand, and the galvanic reaction on the other.

For this purpose it is essential that the subject should be one in whom subconscious processes can be shown to exist by the methods commonly employed in investigation in abnormal psychology.

The subject, B. A., whom we made use of, is one who is particularly favorable for such experiments. It is a case of multiple personality in which one of the personalities claims to be co-conscious with the other.

In order that the experiments may be intelligible it will be necessary to briefly explain the relations of the personalities to one another.¹

The normal personality is known as C. This personality divides up into two others, one of whom is known as A, and the other as B. C is aware of herself in both the other states, A and B. On the other hand, A has no knowledge of either the normal self C, or of her sister disintegrated personality B. B, on the contrary, has a complete memory for the times when she is her disintegrated sister A, or the normal C.

This relationship may be diagrammatically expressed as follows. The arrows show the direction of knowledge.

¹ This is the same case made use of by one of the writers in the series of “Experiments to Determine Co-conscious (Subconscious) Ideation”; *JOURNAL OF ABNORMAL PSYCHOLOGY*. Vol. III., No. 1.

The reason why B remembers the other two personalities is because, as she claims, *she exists as a co-consciousness during the lives of A and C respectively*, and as such a co-consciousness she claims to have a stream of ideas of her own, distinct from the stream of consciousness of the primary personality.

Accordingly, it is clear that B is both an alternating and a subconscious personality. That is to say, when A and C disappear, co-conscious B remains as the sole personality in existence and is then no longer a co-conscious, but an alternating personality. When A or C is present, B's memories persist co-conscious with the respective primary personality. It will therefore follow that any experiences which B has had as an *alternating* personality she would remember as a co-consciousness when A is present, although A would have no recollection of them. And it is clear that, if these co-conscious memories by certain technical methods could be awakened, we might get galvanic reactions therefrom of the source of which A would not be aware. The same would not be true of C, however, because she has a memory of B as an alternating personality; but inasmuch as B, when *co-conscious* with C, has separate perceptions and ideas of which C is unaware, if these co-conscious ideas and perceptions could be tapped while C is present we might get galvanic reactions from this source of which C would be necessarily unaware. Furthermore, there are other co-conscious memories, to be presently described, of which neither A nor C have knowledge.

A, B and C can be hypnotized and then there result three respective and distinctly different hypnotic states corresponding to each of the personalities, namely a, b, c. To show this more clearly, our diagram may be further enlarged as follows:

None of the personalities, A, B or C, has any memory for the hypnotic states.

As to the memories of these hypnotic states, it will be sufficient for our purposes here to state that only b (like B, as shown by other experimental evidence) is *co-conscious* with the other two as well as with the primary personalities, A and C; b is not co-conscious with B, but rather is that personality in the usual dissociated form; both are substantially one. Now it happens that the subject has dreams of which two of the three primary personalities, viz. A and C, have no memory on waking. B and b, however, remember the dreams. Consequently if b is co-conscious with *all* the other states, it would follow that, if we could tap these co-conscious memories of dreams while the primary personalities were present, we might get galvanic reactions of the source of which A and C were unaware.

These principles were made use of in the following experiments. If they are not clear now, they will become so as the experiments are detailed.

I. *Experiments to test the presence of co-conscious emotions in A and C connected with co-conscious memories of dreams and other experiences of which the subject had no recollection when awake.*

As already stated, the subject frequently had dreams of which neither A nor C had any recollection after waking. The occurrence of such dreams was obtained from one or other of the hypnotic states, each of whom remembered distinctly the dream and narrated it in all its details. The hypnotic state, b, gave the following accounts (corroborated by a and c) of two nightmares. I condense them, giving only the relevant details.

In the first dream she thought she was in a *boat* with a companion, under particular circumstances which I omit. A great storm came up. The wind blew and the *waves* grew high and threatened to swamp the boat which she was obliged to manage herself. "The boat went up, up, up and then down, down, down," and "the waves filled the boat and smothered us in foam." Then her companion was gone. Then the waves turned to *cats* which

came down "all over her," filling the boat. (At this point, in describing the cats, the subject, who has cat-phobia, shuddered and seemed horror-stricken. In describing the scene, particularly in speaking of the waves and the cats, the subject was filled with lively emotions.)

In the second dream she thought she was in a dark *cañon* through which she was making her way. It was very dark and the sides of the cañon were covered with *stones*. After reciting in an emotional manner how she tried to make her way through the cañon in darkness, she said that the stones turned to cats and overwhelmed her. As in the other dream, she was filled with lively emotions during the description.

b, it will be remembered, claims to be co-conscious during all the waking states. In addition to reciting the dreams, she now gave an account of an episode which had occurred in the dining car on the journey in company with one of us (M. P.) to New York when C was "awake." b claimed that, during dinner, she co-consciously had seen a lady dressed in black (Mrs. X, whom M. P. knew and who was sitting some seats behind) look her over with her *lorgnette* in, what appeared to her, a somewhat offensive manner. This action had made b co-consciously angry or at least resentful. She said that she (co-consciously) felt at the time that she would like to put the lady out of the car. b had seen her at a moment when C had turned her head and she felt certain that the latter had not noticed the lady, for if she had she would have *thought* of the affair and b would have known her thoughts. b herself suggested this episode as a test, as the fact of the occurrence could be verified by questioning the lady in black, Mrs. X.

After the galvanic experiment was finished, C was questioned as to her memory. She had no recollection of having noticed the episode. Furthermore, as it was C who was in the dining-car, and as A, on whom the first experiment was made, has complete amnesia for the life of C, *she could not have had and, as a fact, did not have, any conscious knowledge of the lorgnette episode.* The testimony of the "lady in black", later obtained, substantiated the account of the episode. It is important to bear in mind

that b, when subconscious, as she claimed, remembered the dream and the episode.

Experiment 1. Accordingly, to test the presence of a subconscious emotion connected with the dreams and the dining-car experience, the words "waves," "boat," "cañon," "lorgnette," "stones" were interspersed among a number of other indifferent words, to wit:—¹minister, ²poor, ³neck, ⁴waves, ⁵grass, ⁶false, ⁷belt, ⁸flower, ⁹boat, ¹⁰kind, ¹¹pride, ¹²seek, ¹³cañon, ¹⁴rich, ¹⁵leaf, ¹⁶travel, ¹⁷lorgnette, ¹⁸trust, ¹⁹busy, ²⁰downstairs, ²¹nobody, ²²stones, ²³big, ²⁴trees, ²⁵give, ²⁶sofa.

The galvanic experiment was made first, as I have said, with A. The curves obtained are shown in Figure 1. It will be seen that marked rises in the curve occur at 4

Fig. 1. Personality A. Dreams and co-conscious experience (lorgnette).
[The tracing is cut into three parts.]

(waves), 9 (boat), 13 (cañon), 17 (lorgnette), 22 (stones). All these rises must have been connected with subconscious associations as the subject had no conscious knowledge whatsoever of her dreams or the lorgnette experience, while they corresponded with the actual dream and subconscious experiences as narrated by the hypnotic states a and b. It will be further seen that there are other rises at 6 (false), 11 (pride) and at 26 (sofa). These are refer-

able to corresponding *conscious* experiences of A, the first two of which are known to one of us (M. P.), the subject herself explaining them.

Experiment 2. On the next day the same experiment was repeated with C. The alterations in the curve (of which only the portions corresponding to "cañon" and

Fig. 2. Personality C. Test experiences same as Fig. 1

"lorgnette" are here reproduced, Figure 2) are not as marked as with A, and with two words ("boat" and "stones") connected with subconscious experiences, and one word ("false") connected with conscious experiences, no rise occurred at all.

This may have been due to the fact that the experiment was a repetition, and therefore the words may have both consciously and co-consciously lost something of their emotional tone on the one hand, and on the other (as respects the word "false"), C, having a full knowledge of the previous experiment with A, not only knew what to expect but, being more stable and normal, is less emotionally affected by any experience.

Nevertheless, it will be seen that there is a readily recognizable rise at 13 (cañon) and 17 (lorgnette).

These two tracings, and subsequent ones, should be compared with Figure 3, taken at rest. This tracing is, comparatively, a straight line.

Fig. 3. Rest Curve.

II. *Relative co-conscious and conscious reactions in different hypnotic states (a, b and c) to same emotions.*

To test the relative reactions of the different hypnotic states a, b, c, to the same subconscious and conscious memories, the test words "Smith" and "ring" were used and finally tactile stimulation. Of the test words, "Smith" referred to an experience in B's life of which the corresponding hypnotic state b only (of the hypnotic states) had a memory. Of this experience B now felt ashamed. It appeared that B, pretending to be A, had disclosed to a Mr. Smith the secret of her psychological disintegration into personalities. A and C* knew nothing of this and therefore a and c had also complete amnesia for it.

The word "ring" referred to a past experience in the life of B when there was disintegration of character without amnesia, so that both A and C knew it. It therefore was part of a *conscious* memory in all three personalities, A, B and C. B had enjoyed the experience; A, owing to the peculiarity of her character, had suffered intense remorse and anguish to a morbid degree. She had, emotionally, almost torn herself to pieces over it, wearing sackcloth and ashes, and the memory of the experience awakened similar feelings. C, however, now remembering the experience, is sorry but philosophical. While regretting, she in no way suffers.

Fig. 4.
Hypnosis c.

Fig. 5.
Hypnosis a.

Fig. 6.
Hypnosis b.

Figs. 4, 5 and 6. Reactions from co-conscious memories in A and C and conscious memory in B for the same experience. A and C had amnesia for this experience (*Smith*).

* This was one of the few hiatuses in C's memory, and has since been filled.

Fig. 4.
Hypnosis c
(continued).

Fig. 5.
Hypnosis a
(continued).

Fig. 6.
Hypnosis b
(continued).

Figs. 4, 5 and 6, continued. Test word, *ring*. Conscious memory in all three hypnotic states for the same experience.

Examining the tracings, of which we reproduce here only the portions corresponding to three stimuli (Figures 4, 5, and 6), we find rises corresponding to both these words. (The remainder of the tracing, corresponding to the indifferent words, showed nothing remarkable.) With "Smith" the greatest disturbance occurred with the hypnotic state c, who had no knowledge whatsoever of the experience connected with the name. The reaction must have been, therefore, due to a *subconscious* memory (belonging to B).

With a, with whom the memory was also subconscious, there was a rise, but much less marked, and approximately the same as that obtained with b, with whom the memory was *conscious*. c, it should be said, was first tested, and therefore, the surprise element may have been a factor in the height of the curve obtained with this state; and yet this explanation will not hold good with the word "ring" which gave curves with each of the hypnotic states, corresponding to the intensity of the feeling which each experienced in remembering the episode. c, first tested, did not show the highest curve, but a, whose feelings were most intense, gave the highest, c the next, and b almost none at all. It also should be noted that when the word "ring" was pronounced, c gave a deep and apparently

emotional inspiration, almost a gasp; a gave a sudden start and similar inspiration, while b laughed. Similarly

Fig. 4.
Hypnosis c
(continued).

Fig. 5.
Hypnosis a
(continued).

Fig. 6.
Hypnosis b
(continued).

Figs. 4, 5 and 6, continued. Reaction to tactile stimulation. a and c were anesthetic and therefore the stimulation was not consciously felt. With b it was consciously perceived.

with the word "Smith," c gave two deep inspirations of the same kind. Finally, after the last of the test words, each of the states, a, b and c, was subjected to a strong tactile stimulation that presumably included an emotional tone. The significance of this lay in the fact that a and c are absolutely anesthetic while b possesses complete preservation of sensation. Corresponding to this tactile stimulation there are marked risings in the curve in each of the anesthetic states as well as in b, showing that, *notwithstanding the anesthesia*, the tactile stimulation was co-consciously felt by a and c.

III. *To test co-conscious reactions in A during automatic writing.*

For this purpose, A was engaged in conversation in order to hold her conscious attention. While she was con-

versing in a perfectly alert state, her hand was directed to write automatically an account of the dreams made use of in the previous experiments and of the lorgnette experience with the "lady in black" in the car, of all which A had no knowledge. The hand wrote a short account, as directed, bringing in the words "boat," "waves," "cat," "dark," "lady" (in black), "lorgnette," etc. Corresponding to these significant words there were oscillations in the curve, (Figure 7). It was not, however, easy, for technical reasons,

to record accurately the time of the occurrence of a co-conscious thought and connect it with the corresponding curve, as of course the thought arose before it was expressed in writing. The tracing was also much disturbed by the conscious emotional condition of A's mind, who waked to find herself with a stranger, introduced to aid in the experiment, in a situation of which she had no previous warning. All sorts of collateral thoughts were running through her mind, as C afterwards explained, owing to her embarrassing situation and fear of betrayal of her secret, etc. The tracing is probably also modified by artifacts. Nevertheless the curve is interesting and shows certain approximate relations with the co-conscious thoughts.

IV. Experiments to test memories of personality B co-conscious with personality A who was the subject.

Exp. 1. The test word was "Smith" and referred to an experience in B's life, already described, the memory of which was now co-conscious in A. The indifferent words were: — ashes, blue, song, read, Mr. Skillings, bright, Mr. Gill, forceful, Smith, good, tip-cart, copper, foot, lazy, shovel, run, towel, cold, kitchen, ring, carriage, modest,

floor, laugh, tongs, hot, hand. Examination of the curve (Figure 8)* shows a practically straight line until the word

Fig. 8. Personality A. Reaction from co-conscious memory for episode (Smith) for which A had amnesia.

"Smith" is reached, when there is a marked rise. The subject, when afterwards questioned, said that the word simply aroused associations with her sister whose name it also was, but that these associations were emotionally indifferent and the word had no particular conscious significance for her. Of course her sister was not the person referred to in the episode in which B played a part. This rise, therefore, can be only interpreted as due to co-conscious associations.

Exp. 2. The test word was "darling." The subject, as before, was A. The indifferent words were: coal, red, song, reach, Myopia, rake, Mr. Gill, signify, *darling*, Norfolk, hoe, tin, street.

The word "darling" referred to a very comical experience in the life of B of which A had no knowledge. The memory of the episode was, therefore, co-conscious in A. It referred to a scene in which the word played a ridiculous

Fig. 9. Personality A. Reaction same as in Fig. 8 from co-conscious memory (darling = x).

part. The curve (Figure 9) shows a fairly straight line with a marked rise at "darling."

* Excepting when the reproduction of the whole seems necessary, we give in this tracing and in the others only those portions which have a direct bearing on the experiment. The remainder of the tracings may be assumed to be negative.

V. To test conscious memories in A.

The test words were "cats," "wall-papers," "hat," "black," interspersed as follows: ¹bad, ²cats, ³drink, ⁴wall-papers, ⁵good, ⁶danger, ⁷hat, ⁸business, ⁹walk, ¹⁰hammer, ¹¹cry, ¹²black, ¹³round, ¹⁴mouth.

Fig. 10. Personality A. Reaction from conscious memories. "Cat"(4) upper tracing, and "hat"(9) lower tracing.

The word "cat" referred to an intense phobia for this animal which the subject has had ever since childhood. Its probable origin is in a childhood experience revealed through automatic writing. The subject, in none of her personalities or hypnotic states, has any recollection of the episode. The dislike of cats is so intense that the mere mention of the word produces a strong emotional effect and the presence of a cat has frequently produced an emotional shock. (See above account of dreams.)

The word "hat" is associated in her mind with several quarrels which she has had with her other self, B, over the kind of hat she should wear, B purchasing a light colored hat which A has as often exchanged for a black one. In fact, A is given to dressing in black which B dislikes, preferring light colors. Hence the word "black" was inserted.

The word "wall-papers" referred to similar quarrels over the selection of wall-papers for her house.

Figure 10 shows a marked rise in the curve at 4 (cats) and a distinct though not so high a rise at 9 (hat) and at 14 (black). The effect of "wall-papers" (6) was not especially marked.

VI. To test perception in the peripheral field of vision. Subject: personality C.

By a series of preliminary tests the point in the periphery of the field of vision was determined within which

objects could be perceived but not recognized. This having been determined, the following objects, with due precautions, were successively advanced from behind into this outer field. Although the subject perceived each, none was recognized excepting the last. The minute the last, which was a toy cat, was brought in this field, although, I think, it was not advanced beyond the position occupied by the others, the subject gave a start and shriek and ex-

Fig. 11. Personality C. Peripheral vision of objects.

claimed "Cat!" The tracing (Figure 11) shows a straight line until "cat" is reached, when a sharp, abrupt curve is recorded. The light of the galvanometer travelled 18 centimeters.

The objects were: 1, matchbox; 2, pencil; 3, roll of paper; 4, watch; 5, toy cat. None of the first four objects were recognized visually by the patient, although she guessed the watch by hearing the tick which had inadvertently been forgotten. She could not describe in any respect any one of the other three objects.

When, however, the patient was hypnotized and put in the state b, the state which claims to be co-conscious, she was able to describe with minute accuracy each object, claiming that *she had seen them by peripheral vision, although the waking consciousness had not.*

VII. *Conscious reactions during "crystal visions."*

Subject: personality A.

The subject was made to look into a crystal and reproduce a so-called "crystal vision" which, by suggestion, was made to take the form of the dream of the cañon, recounted above. As she looked into the crystal she recited what she saw, the dream unfolding itself like a panorama before

her eyes. She saw herself walking through this cañon exactly as she had dreamt it. The details exactly reproduced the dream. Whilst the vision unfolded itself, a tracing was taken.

While describing the vision, the subject, as is usually the case with crystal visions, experienced over again all the thoughts and emotions of her vision itself. At one place

Fig. 12.
Personality A.
Crystal vision.

she saw the stones turn to cats (x, Figure 12). Then she saw herself walking alone through this solitary place, sad and depressed by her helpless situation.

The tracing before "cats," not being remarkable, is omitted. The rise at "cats" was maintained by a succession of emotional states producing oscillations in the tracing. In the absence of a stenographer it was impossible to take down the recital verbatim, nor was it possible, for technical reasons, as in automatic writing, to connect the curves accurately with the ideas as they were unfolded.

Fig. 13. Personality A. Crystal vision.

Another tracing taken during a crystal vision is represented in Figure 13. In this vision she saw the representation of a previous actual episode in her life occurring during the interment of her mother in the cemetery, and also *during a trance state (supposed to be a faint) into which she fell at the time*. She had very little or no conscious recollection of this episode owing to her having been in this abnormal condition, and yet she saw in detail everything that occurred in the trance. The correctness of the vision has been verified. The tracing shows the rise in the curve where she saw the scene in the cemetery. At this point she turned her head away from the crystal and kept exclaiming: "I can't look! I can't look!" etc.

VIII. *Word associations in the co-conscious.*

An attempt was made to test the reactions to word associations in the *co-conscious* as distinct from conscious associations. For this purpose, A's attention was engaged in conversation and the hand was made to write automatically. By the well known process of abstraction words were given to the co-conscious by whispering and the hand was directed to write the words associated in the co-conscious. By this method the subject does not *consciously* hear the words, but they are heard co-consciously. The test words used were those used before, viz: "Smith," "ring," "lorgnette," "darling."

There was some difficulty in carrying out the experiment as the co-conscious (B) rebelled after the first three words and refused to disclose its thoughts. It finally consented, however, to write a word in response, though that word might not be the first thought of.

<i>Test word</i>	<i>Co-conscious associated word</i>
1. sleep	dreams
2. fruit	apples
3. bad	+ ¹
4. mouth	("I shan't speak"); teeth
5. jolly	gay
6. fun	pleasure
7. Smith	lie ²
8. bed	rest
9. pretty	lovely
10. danger	("I can't think")
11. ring	Lowell ²
12. business	work
13. dead	buried
14. lorgnette	woman in black ²
15. cry	weep
16. upstairs	attic
17. darling	pencil ²
18. blood	cut
19. offer	horrid man ²

¹ This mark was made by B because unwilling to disclose the name of a certain person.

² These words disclose episodic associations with the test words and represented associated thoughts, or judgments of the original experiences, viz., "bad," "Smith," etc.

The tracing, made under the same conditions as Figure 7 (page 124), showed general irregular oscillations due to conscious perturbation, as well as to the co-conscious word reactions and possible artifacts. As these cannot be distinguished from one another the tracing is omitted here.

The word-responses in this experiment are particularly interesting as bearing on the psychological interpretation of subconscious processes. It is difficult to explain such word reactions through pure physiological processes.

Conclusions.

1. In certain pathological conditions, active subconscious processes, i.e. memories of some kind which do not enter into the conscious life of the individual, may exist.

2. Memories of conscious experiences which the subject can not consciously recall, i.e. for which he has amnesia, may be conserved and give rise to the same galvanic reactions which are obtained from conscious emotional states.

3. The reactions are compatible with and, so far, confirmatory of the theory that these subconscious processes are psychical (co-conscious).

4. To explain these reactions by the theory of physiological reactions is possible but far fetched.

5. In dissociated (hysterical) anesthesia, tactile stimulation, though not consciously felt, may give rise to the same reaction as when consciously perceived.

6. Objects not consciously perceived by peripheral vision may be co-consciously perceived.