

STUDY OF MENTAL DEFICIENCY BY TWIN METHOD

KEN-ICHI KISHIMOTO

The Research Institute of Environmental Medicine, Nagoya University
(Director: Prof. Ken-ichi Kishimoto)

I. PREFACE

It was Smith¹⁾ who first made a survey of the causes of mental deficiency by systematically using the twin method. According to him, of the 13 pairs of identical twins surveyed, there were 11 pairs where both twins were mentally deficient and two pairs, that were not. On the other hand, of 50 cases of fraternal twins, only 4 agreed and 46 disagreed. Among identical twins, it often occurs that despite the fact that at time of birth there existed no birth obstruction or epidemic, both simultaneously fell victims to hemiplegia, language disturbance or convulsion. This would mean that a part of mental deficiency accompanied by nervous symptoms is caused by heredity. He also obtained an 80% probability of manifestation, from the number of disease agreements against the total. Luxenburger²⁾ weighing the results of Smith, criticized that the above disagreements were the results of Smith not discriminating external cause from internal. Luxenburger opined that if, as has been made clear by Brugger's and Loday's previous investigations, we take into consideration the fact that a 20% externally-caused mental deficiency is included in the material for ordinary mental deficiency, we have to revise this probability of manifestation to as high a value as about 100%, and the occurrence of mental deficiency will be absolute. He also stated that judging from Smith's material, mental deficiency is not accompanied by a lethal factor. Thus he emphasized the theory that mental deficiency is hereditary.

Rosanoff, on the other hand, stated that of the 95 pairs of mentally deficient twins he treated, 33 pairs of identical twins out of 35 pairs agreed, while only 32 pairs of fraternal twins out of 60 pairs agreed. Of the total number of mental deficiencies, 69 were females and 91 males. He surmised that there are two recessive genes for mental deficiency; an autosome gene and a sex chromosome gene. He continued on his investigations, the total amounting to a high figure of 366 pairs. According to him, out of 126 identical twins, 115 (91%) agreed and 11 (9%) disagreed; of 101 fraternal twins of the same sex, 62 (61%) agreed and 39 (39%) disagreed; of 139 pairs of different sexes, 66 (48%) agreed and 73 (52%) disagreed. Of the fraternal twins of different sexes, only 35% in males were abnormal against 17% in females. He added that the percentage of agreements in sib is 16%, and, pointing out that the percentage of mental deficiencies is higher in twins, especially in identical twins, and that there are more agreements in fraternal twins than in sib, he concluded that external injuries at time of delivery cause mental deficiency, emphasizing

his theory of external causes. He explained the differences in percentage by sexes as due to sex linked inheritance.

Similarly, Brander³⁾ is of opinion that twins are prone to fall victims of mental deficiency, epilepsy, and infantile paralysis, caused by external injury at time of birth. According to him, of the 86 pairs of twins brought under his survey, he found 10 with mental deficiency, out of which 3 pairs (1 identical, 2 fraternal) were born by breach presentation, thus corroborating the theory of external injuries.

After the above-mentioned scholars, Juda⁴⁾ made a multi-angled investigation on 392 pairs of mentally deficient twins. He found that out of the total, 60 pairs of identical twins with internally-caused mental deficiencies agreed and were high in probability of manifestation; of 75 pairs of same-sex fraternal twins, 47 (62%) agreed while of 93 pairs of different-sex fraternal twins, 29 (31%) were equal. He added that in them the type of heredity was recessive and there is no sex linkage.

A through examination of the above records (literature) shows that in such a field as mental deficiency, where no dependable authority for biological diagnosis can be obtained except for those, termed psychological, sociological, and pedagogical data, and which are continually moving towards normality, the terms "agreement" and "disagreement" can not be used with certainty.

Ordinarily we summarily classify mental deficiencies into two causes: internal and external—heredity being the former, and injuries to the brain at time of, and after, delivery being the latter. This method of division may be possible, but, when we speak of internal environment, and external environment during conception, it is not easy to distinguish between internal and external causes. Moreover we can not but conclude that, in most cases, these mental deficiencies are not due to pure heredity or to pure environment, but the two causes overlap each other so that the result is simply a question of degree.

II. MATERIAL

First, I sent out queries to primary and middle schools in the following cities and prefectures in 1941, to obtain information on the existence or non-existence of mentally deficient twins, and for the twelve years thereafter. I made detailed investigations on the information obtained and the are results as in the attached lists.

Queries sent to schools in { Cities: Nagoya, Osaka, Kyoto, Kobe, Shizuoka,
Gifu, Hiroshima
Prefectures: Aichi and Gifu

Before proceeding, let me make clear that I have excluded all seeming mental deficiencies, but, keeping an eye on their school work, have picked up those whose intelligence indexes (Binet-Suzuki method, Okabe's B method) were below 90. My material, so to speak, consists of non-selective serials in a broader sense. My target was placed on 25 pairs of identical twins, 18 pairs of same-sex fraternal twins and 4 pairs of different-wex fraternal twins.

III. THE METHOD

First, I questioned on the twins' parents, kinsmen, and acquaintances concerning their heredity and developmental history (in the womb, at time of birth, during lactation, childhood days, school days). Next, in order to know their present health condition, I made detailed investigations, ranging over 60 items including blood-types and finger-print genotype. In the third place, in order to learn their present mental state, I obtained information of the school records and practiced intelligence tests (Suzuki-Binet's tests, Okabe's B type test, free-drawing test), and, in order to find their personal traits, obtained clinical character-signs sent me by parents and teachers, with the use of Jung's version tests (the type of test that I standardized from the standpoint of dynamics), Kraepelin's serial additions test (my own modification), character 6 dimension etc.

As a start, the first question was how to decide whether monozygote or dizygote. Hitherto it has been made by the number of placentas, but, since Verschuer reported on a case where, though there were two placentas, the twins had to be considered as monozygotic, the value of the decision of the number of placentas has fallen.

At present, we adopt as method of "Polysymptomatische Ähnlichkeitsmethode," which was first suggested by Siemens in 1924 and afterwards confirmed by Verschuer. Of the tests involved in this method, that of blood type is the most exact in deciding the zygote question—I tested ABO type, MN type, Q type, E type, S type and at times Rh type. For finger-prints, I made use of the Bonnevie-Geipel genotype, but I have some doubts regarding its soundness—concerning which please see another treatise of mine. As to palm-prints and sole-prints, Wilder's (1918) schema were consulted. After these, I considered that the forms of hair, the tints of skin and eyeballs were no less important factors. In addition to these, I referred to about 60 items in physical traits and other tests in deciding zygotes. Constituting as it does an important role in this survey of mine, I have been very careful on this point, and I excluded about 10 doubtful pairs from my target, which might belong to what Danforth calls the 3rd type. I shall deal with them in a future treatise.

IV. RESULTS

(Table 1-6)

V. SUMMARIZATION AND DISCUSSION

Hitherto, most students on mental deficiency in twins have vaguely used the terms "agreement" and "disagreement." I think we must be a little more strict on this point and divide them into agreements or disagreements in Manifestation and Expressivity. Seen from the two standpoints, the results of the foregoing tables may be summarized as in List 7 (table 7).

On the whole, the results are inclined to agree closely with those by various scholars hitherto engaged in this study. Namely, identical twins all agreed in manifestation, and, as Luxenburger says, their probabilities of manifestation are 100%. Of these, as may be seen in table 1 (a), there are observed very few

TABLE 1. Mental Deficiency in Identical Twins
 (a) Group in Which Manifestation Agreed Entirely and Expressivity Almost Agreed

No.	Name	Sex	Age	Causes			Character traits	School records	Intelligence		Diagnosis	
				Heredity	During pregnancy	Time of birth			After birth	Suzuki's		Okabe's
1	K. S.	♂	10 yrs. 2 ms.	Mother ment. defic.	Nothing to speak of	Easy delivery, light weight <i>Ditto</i>	Both weak; when feverish, convulsive fit. Both enuresis; otorrhea	Introversive	Poorest special class	45	Imbecility	
	K. T.							Slightly extroversive	<i>Ditto</i>	"	"	
2	K. J.	♂	12 yrs. 2 ms.	Mother, elder sister and elder brother all backward	"	Easy delivery, 8 months	Hydrocephalic skull	Introversive and obedient; industrious	Tolerable	73	87	Debility
	K. D.					<i>Ditto</i>	<i>Ditto</i>	Slightly intro- versive and <i>ditto</i>	<i>Ditto</i>	"	89	"
3	Y. K.		12 yrs. 4 ms.	(-)	"	Somewhat large		Extroversive	47/50	71	83	"
	Y. K.	♀				Somewhat small; didn't cry for one day		"	43/50	"	"	"
4	M. K.	♀	8 yrs. 10 ms.	(-)	Seriously ill with kidney and heart dis- ease; dropsy over whole body since 7 months	450 momme; syncopic state at breech pre- sentation		Introversive	54/58	75	107	Back- wardness
	M. N.					400 momme		Introversive; more active than the 1st	50/58	"	87	"
5	T. K.	♂	10 yrs. 7 ms.	Cousin-mar- riage; aunt on father's side, schizophrenia	Mother felt pain after 7 months of pregnancy	Easy delivery 610 momme <i>Ditto</i> , 600 momme		Rash but active	Medial a shade lower	84	89	"
	T. S.							Somewhat calm	<i>Ditto</i>	82	90	"
6	H. H.	♂	14 yrs. 6 ms.	(-)	Noth. to sp. of					60		Debility
	H. F.									59		"
7	E. I.	♂	8 yrs. 9 ms.	(-)	"			Introversive	Medial a shade lower	88	94	Back- wardness
	E. S.							<i>Ditto</i>	<i>Ditto</i>	"	86	"

TABLE 2. Mental Deficiency in Identical Twins
 (b) Group in Which Manifestation Agreed but Expressivity slightly Disagreed

No.	Name	Sex	Age	Heredity	Cause			Character traits	School records	Intelligence indices		Diagnosis
					During pregnancy	Time of birth	After birth			Suzuki's	Okabe's	
1	S. M.		8 yrs.	(—)	Noth. to sp. of	Easy delivery, 500 momme	Short-tempered suffered pneumonia	very similar in	Tolerable	60		Imbecility
	S. F.	♀	1 ms.									
2	Y. T.		11 yrs.	(—)	Dropsy over whole body and difficult in walking	Premature delivery, 500 momme		Sluggard prone to sulk	68/70	72		Debility
	Y. K.	♀	1 ms.									
3	B. K.		11 yrs.	Both parents illiterate	Noth. to sp. of	Easy delivery bigger than ordinary	Weak	Obedient taciturn, fond of cleanliness; very intro-verse	34/46	84		Back-wardness
	B. K.	♂	3 ms.									
4	O. J.		7 yrs.	(—)	"	Easy delivery, 650 momme		Slightly brighter	54/64	80		"
	O. R.	♀	8 ms.									
5	S. K.		12 yrs.	(—)	Severe morning-sickness	Premature delivery, 700 momme		Medial a shade lower	Medial a shade lower	74	107	"
	S. C.	♀										

M. U.	M. M.	Sex	Age	Mother's character	Sp. of	Easy delivery	Light Nystagmus in the left eye	Cheerful, obedient, kind	Tolerable	IQ	Backwardness
6	M. M.	♀	9 yrs. 3 ms.	(-)	Noth. to sp. of	<i>Ditto</i>	<i>Ditto</i> in the right eye staphyloia in the left eye went blind 4 days after birth	Dull in memory and under-standing; gets weary soon	"	60	"
7	H. J. H. T.	♂	8 yrs. 2 ms.	(-)	"				"	85 80	" "
8	Y. E. Y. K.	♀	10 yrs. 1 ms.	Mother's character abnormal	"	Easy delivery, 650 momme "	At 6 years, ball hit head, became unconscious	Enuresis Nocturna until February this year; does not get familiar with others	"	57	Debility
9	I. D. I. S.	♀	10 yrs.	(-)	"	Easy delivery, 620 momme Easy delivery, 600 momme	Noth. to sp. of	Somewhat in bright nature	Tolerable; better than the first	67	"
10	K. S. K. T.	♂	"	(-)	"	Easy delivery, 550 momme Easy delivery, 500 momme		Sturbborn Weak-hearted; indolent	39/52 40/52 Medial a shade lower <i>Ditto</i>	78 81	Backwardness " "

TABLE 3. Mental Deficiency in Same-Sex Fraternal Twins
(a) Group with Both Manifestation and Expressivity Agreed

No.	Name	Sex	Age	Causes			Character traits	School records	Intelligence indices		Diagnosis
				Heredity	During pregnancy	Time of birth			After birth	Suzuki's	
1	O. M.	♂	11 yrs. 10 ms.	Mother and elder brother ment. def.	Noth. to sp. of	Picked out by midwife and gruel in daytime	Mother's milk at night; cow's milk and gruel in daytime	Tolerable	78	95	Backwardness
	O. M.					Delivered first	Mother's milk only	<i>Ditto</i>	"	88	"
2	T. I.	♂	7 yrs. 3 ms.	Mother ment. def.	"	Easy delivery, 460 momme	Mother's milk	Tolerable	86	Impossible	"
	T. N.					<i>Ditto</i> , 620 momme	Cow's milk	<i>Ditto</i>	83	"	"
3	K. Y.	♀	7 yrs.	Younger brother ment. def.	"	Easy delivery, 550 momme		Tolerable	89		"
	K. H.					<i>Ditto</i> , 700 momme		<i>Ditto</i>	86		"
4	I. R.		9 yrs.	(-)	"	Premature birth, 460 momme	Purpura (at 4)	Medial	74		"
	I. K.					<i>Ditto</i> , 520 momme	Inflammation of the bladder (at 4)	<i>Ditto</i>	77		"

TABLE 4. Mental Deficiency in Same-Sex Fraternal Twins
(b) Group in Which Manifestation Agreed but Expressivity Slightly Disagreed

No.	Name	Sex	Age	Causes			Character traits	School records	Intelligence indices		Diagnosis
				Heredity	During pregnancy	Time of birth			After birth	Suzuki's	
1	I. K.	♀	8 yrs.	(-)	Noth. to sp. of	720 momme	Nothing worth mentioning	Medial a shade lower	83		Backwardness
	I. M.					680 momme was in asphixia	<i>Ditto</i>	<i>Ditto</i>	77		"

2	O. T.	♂	14 yrs.	(-)	"	500 momme	<i>Ditto</i>	More Introversive	Medial a shade lower	78	"
	O. J.				"	580 momme	"	Introversive	<i>Ditto</i>	82	"
3	F. I.	♀	9 yrs. 4 ms.	(-)	"	700 momme	"	Somewhat unstable in emotion and will	33/36	86	106
	F. I.				"	650 momme	"	More unstable in emotion and will	34/36	76	86

TABLE 5. Mental Deficiency in Same-Sex Fraternal Twins
(c) Group with Remarkable Disagreements Even in Expressivity

No.	Name	Sex	Age	Causes		Time of birth	After birth	Character traits	School records	Intelligence indices		Diagnosis
				Heredity	During pregnancy					Suzuki's	Okabe's	
1	T. E.	♀	7 yrs. 8 ms.	(-)	Noth. to sp. of			Remarkably retired nature	Tolerable	64		Debility
	T. T.							Slightly brighter	Medial a shade lower	74		Backwardness
2	T. S.	♀	8 yrs. 1 m.	(-)	"	720 momme		Ordinary on the whole	27/31	92		Ordinary
	T. T.					500 momme		Restless	50/31	75		Backwardness
3	N. R.	♀	10 yrs. 1 m.	(-)	During pregnancy, facial nerve paralysis		Physique develops better than the 2nd	A little nervous	60/64	73	86	"
	N. S.							Nervous	61/64	64	83	Debility
4	K. N.	♂	9 yrs. 8 ms.	Mother ment. defic.	Difficult delivery, 480 momme			Morbidly frivolous	Tolerable	70	70	"
	K. T.				<i>Ditto</i> , 520 momme			Slightly frivolous	"	79	85	Backwardness

TABLE 5 (Continued).

No.	Name	Sex	Age	Causes			Character traits	School records	Intelligence indices		Diagnosis
				Heredity	During pregnancy	Time of birth			After birth	Suzuki's	
5	Y. S.		9 yrs.					Tolerable	75		Debility
	Y. K.	♂	10 ms.	Mother ment. defic.	Noth. to sp. of		The second is somewhat extroversive	Medial	115		Ordinary
6	C. T.						Retired nature	Tolerable	51		Imbecility
	C. K.	♀	9 yrs. 7 ms.	(-)	"	Legs came first (foot position) Came head first (head position) weightier than the first	More retired nature	Medial a shade lower	71		Debility
7	K. M.		11 yrs.	Mother and younger sister ment. defic.	"	460 momme	A little retired nature	"	82	87	Backwardness
	K. T.	♂	1 m.			540 momme	Ordinary	Medial	96	82	Ordinary
8	M. M.					Easy delivery. 570 momme	Gentle	Medial a shade lower	81		Backwardness
	M. Y.	♀	11 yrs.	(-)	"	<i>Ditto</i> , 650 momme	Extremely taciturn	Medial	95		Ordinary
9	I. H.		4 yrs.			Easy delivery, 800 momme	Gentle, but when excited, anger is great		88		Backwardness
	I. T.	♂	9 ms.	(-)	"	<i>Ditto</i> , 780 momme	Strong-minded, make up to mother		102		Ordinary
10	T. K.		9 yrs.			Easy delivery, small	A little obstinate	Medial a shade lower was one year late in going to school	76		Backwardness
	T. T.	♂	5 ms.	(-)	"	<i>Ditto</i>	Negative	Tolerable was one year late in going to school	60		Debility

TABLE 6. Mental Deficiency in Different-Sex Fraternal Twins

No.	Name	Sex	Age	Heredity	Causes			Character traits	School records	Intelligence indices		Diagnosis
					During pregnancy	Time of birth	After birth			Suzuki's	Okabe's	
11	N. Y.	♂	10 yrs. 1 m.	Elder sister ment. defc.	"	Foot position, 940omme	Nervous, retired nature	Good, a shade lower	74	66	Backwardness	
	N. Y.	♀				Head Position, 740omme	Frank and open-hearted	Good, a shade lower	69	Impossible	Debility	
1	H. T.	♂	12 yrs. 11 ms.	Mother, Debility; elder sister, debility; elder brother, Backwardness	Noth. to sp. of	Easy delivery 660omme	In comparison with the 2nd extroversive	52/52	84	Impossible	Backwardness	
	H. U.	♀				<i>Ditto</i> , 560omme		58/58	64	"	Debility	
2	E. M.	♂	12 yrs. 9 ms.		"	Easy delivery, 750omme	More extroversive than the second	23/26	90	97	Backwardness	
	E. Y.	♀				<i>Ditto</i> , 600omme		45/45	58	50	Imbecility	
3	F. T.	♂	6 yrs. 11 ms.	Mother and elder sister ment. defc.	"	Easy delivery 1,000omme	Bashful		70	Impossible	Debility	
	F. K.	♀				<i>Ditto</i> , 850omme	<i>Ditto</i>		101	"	Ordinary	
4	Y. S.	♀	12 yrs. 3 ms.		"	Easy delivery 650omme	The first one is extroversive	Both	80	73	Backwardness	
	Y. S.	♂				<i>Ditto</i> , 830omme		Poor	90	88	Ordinary	

TABLE 7. Summarization of Mental Deficiencies in Twins

Identical	a. Agreed in manifestation and expressivity		15 cases
	b. Agreed in manifestation, slightly disagreed in expressivity		10 "
Same-Sex Fraternal	a. Agreed in manifestation and disagreed in expressivity		4 "
	b. Agreed in manifestation and slightly disagreed in expressivity		3 "
	c. Disagreed in manifestation	Disagreements in degrees of mental deficiency	6 "
Disagreements between ordinary and mentally deficient children		5 "	
Different-Sex Fraternal	Disagreed in manifestation	Disagreements in degrees of mental deficiency	2 "
		Disagreements between ordinary and mentally deficient children	2 "

instances of heredity in mental deficiency among the 15 pairs in whom both manifestation and expressivity agreed. This fact, however, can be explained if recessive heredity is taken into consideration. In the case of the 14th pairs, despite the differences in their social environments—the first one having been brought up by the grand parents on the mother's side since two years of age and the second one grown up under the parents' care—their mental developments agreed. In the case of the 15th pair, although the first one received A-bomb injuries in Hiroshima at a distance of 1.4 km from the bomb center when seven years of age and the second one did not, mental development is slightly in favor of the former, which proves even physical environments have not much influence upon brains that have reached a certain stage.

Next, see table 2 (b) and we find 10 cases in which expressivity slightly disagreed. The differences, however, between (a) and (b) are in degrees and not in essence. But how did these differences in expressivity come about? They may be due to the internal environments, either differences in the mother's womb, obstructions at time of birth, or obstructions met after birth. In the 1st, 2nd, 3rd, 4th and 5th pairs, it is clear that those who were heavier at time of birth develop a better mentality. They must have been supplied with better and more blood while in the womb.

On the contrary, as seen in the 9th and 10th, there are cases in which those who weighed more at birth had poorer mental developments thereafter. So, weight-at-time-of-birth can not be depended upon as indexes. The firstborn in the 8th pair who was struck on the head by a ball and became unconscious for a time, has had since then, poorer mental character development than the second who had enuresis nocturna until he was 10 years old. But we may not be able to conclude by this single instance that external injury to the head obstructs mental development.

Next, as seen in table 3 (a), there are 4 cases where same-sex fraternal twins nearly agree in both manifestation and expressivity. Here arises a question: why do they agree despite that their heredities and weights at birth differ? Perhaps those belonging in this category are comparatively light cases

of mental deficiency, and may be produced through the sharing of the same home, the same school and the same community.

In table 4 (b) we also find 3 cases among same-sex fraternal twins, in which manifestations agree, but expressivities slightly disagree.

But we may set it down as a general rule that both manifestation and expressivity disagree in fraternal twins, because fraternal twins' genes are dissimilar to the same degree as those of brothers (sib), and also the differences in environments have to be taken into account. Of the 11 pairs in this category, there are 5 pairs, the components of each of which have quite different manifestations: one is mentally deficient and the other, ordinary; and 6 pairs in which, though mentally equally deficient, differences in expressivity are noticed: backwardness, debility, or imbecility.

As seen in table 6, we have here 4 pairs of different-sex fraternal twins with both members in each case differing in manifestation and expressivity. It goes without saying that this is due, besides the difference seen in same-sex fraternal twins, to biological differences in the shape of sex-hormones, to differences in social environment and of psychological environment, based on the fact that they are either boys or girls.

Hitherto there have been some such as Rosanoff and Brander who stressed twins' obstruction at time of birth. But it must be remembered that it is not merely the mentally deficient that show frequent breech presentations, and ordinary twins or superior twins show also breech presentation to the same degree.

Can we agree with Rosanoff and others who conclude that twins are more prone to mental deficiency, that can be traced to various external causes?

TABLE 8. Ratios of Mental Deficiency in Sib: Mentally Deficient Twins Versus Ordinary Twins

		Number of Pedigrees	Number of Sib	Number of Ment. Defic. among them	Ratio
Mentally deficient	Identical	15	58	4	4/58
	Fraternal	14	45	7	7/45
Ordinary	Identical	10	33	0	0/33
	Fraternal	8	23	1	1/23

Suppose all mentally deficient twins were products of external causes, the rate of mental deficiency among their sib should be equal to that of mental deficiency among ordinary twins' sib. Table 8 clearly shows that there is a significant difference from the stochastic standpoint. Therefore it may be naturally inferred that mental deficiency among twins comes from the same cause—especially heredity—as among singly-born children.

Why, then, of the mentally deficient twins, is the ratio of identical twins' to sib lower than in fraternal twins'? It is not difficult to infer, that the former include some cases coming from external causes.

Judging from the above, so far as obstructions at time of delivery are concerned, identical and fraternal twins have been placed under much the same conditions, as has been referred to in another treatise of mine, so we shall have to consider obstructions during the conception period.

VI. CONCLUSION

(1) In such circumstances of the mental deficiency as idiocy, imbecility, debility and backwardness continue in order, finally to normal, I would like to propose not only the agreement or non-agreement of manifestation (mental deficiency or normal) but also that of expressivity (defference of the grade of mental deficiency).

(2) (a) Identical twins agree in all manifestations, namely, their manifestation probability is 100%.

(b) Their social environments such as differences in education method or biological environment such as A-bomb injury or non-injury, are not much concerned in the causation of mental deficiency.

(c) Slight differences in expressivity were found in 10 pairs out of 25 tested. Perhaps these were chiefly brought about through differences in the womb-environment because they ran parallel with those in weight. There was only one pair showing an external-environmental case—external injury in the head rendered the recipient lower in intellect than the non-recipient.

(3) Of the fraternal twins uuder review, 11 pairs disagreed in manifestation, 3, though agreeing in manifestation, disagreed in expressivity, and 4 almost agreed both in manifestation and expressivity.

(4) All different-sex fraternal twins, 4 pairs, disagreed in manifestation.

(5) Against the several theories hitherto proposed that mental deficiency in twins is due in most cases to obstruction at time of birth and other external injuries, I would like to propose a "heredity theory." The reason being that the ratio of mentally deficient twins' sib becoming mentally deficient is higher than in ordinary twins' sib; this certainly disproves the theory that twins generally are prone to mental deficiency.

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