

**THE METHOD OF CO-TWIN CONTROL  
IN CONJUNCTION WITH THE METHOD OF CINEMANALYSIS**

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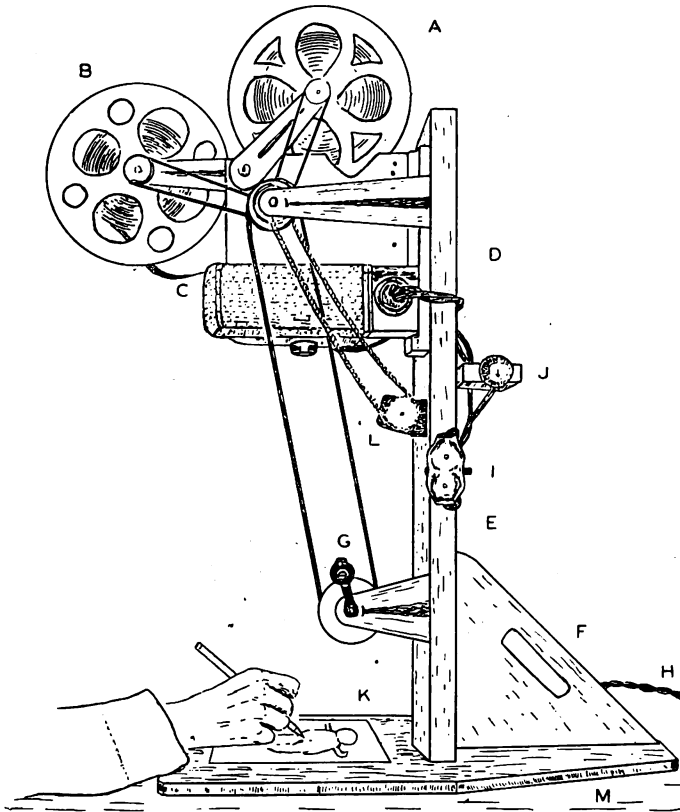
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The study of twins and of the process of twinning is attaining the stature of a subsience. With the publication of Professor Luigi Gedda's monumental volume and the inauguration of a special journal in this field, the various methods of investigation will receive increasing critical consideration.

Significantly enough, twins are not only a target of research; they constitute a tool of research for the exploration of problems which go well beyond immediate boundaries. I recall that in our early studies of twins we were chiefly fascinated by the correspondences, and the amazing identities of the pairs of twin children under observation. The correspondences were so impressive that they absorbed most of our attention. But in time we came to realize that the mechanisms which determined the almost uncanny identities were of greater scientific importance. A study of the phenomenon of hemihypertrophy also brought into prominence the *process* as well as the products of twinning.

This led us to devise the method of co-twin control for the objective study of biological and psychological factors in early human growth. It is a comparative method which permits naturalistic, clinical and experimental observations; and has proved especially effective in the bio-genetic investigation of child development. In identical infant twins, nature provides a stage for observing the effects of developmental factors which are experimentally or otherwise confined to one twin. The co-twin is then used as a baseline for comparison.

Our original co-twin experiment was initiated with a remarkably similar pair of infant girls. At the age of 46 weeks Twin T was systematically trained in stair-climbing for a period of 6 weeks. Twin C was reserved as a control; she was not permitted any stair-climbing experience. At the age of 52 weeks, and at subsequent periods, Twin C was given an opportunity to display her stair-climbing abilities. The performances of both twins were periodically recorded by cinema so that comparative observations were made by film as well as in the flesh. The manipulability of the film records made possible a most interesting variety of inter-twin comparisons at contemporaneous and at disparate ages.



Cinemanalysis is a method of observation which permits one to examine the successive phases of motion with deliberation. The simplest device for accomplishing this analysis is an ordinary projector, mounted on a portable vertical stand which rests on a desk or table. The projector is operated by a small handcrank and throws on image 4" by 5" in size upon a white enamel plate. The operator controls the successive images by means of the crank. He employs the analytic viewer in much the same way that he would use a microscope for histologic study. In one case he examines a specimen of tissue; in the other, a specimen of behavior. Each frame pictures a phase of motion. The film can be observed in motion. Any individual frame can be stilled for close study and tracing of patterns.

The memory of cinematography is infallible and constant. The motion picture film revives the images of the behavior patterns in authentic life-like integrity. Moreover, the records of different ages are interchangeable so that we may compare Twin T at 46 weeks with Twin C at 46, or 52 or 56 weeks. The twins themselves are time-bound but their cinematic embodiments can be transposed and juxtaposed at the will of the investigator so that he may gain a deeper insight into the developmental morphology of behavior patterns. By comparative views he finds clues to the relationships of learning and growth, of maturation and training.

It has been demonstrated that the method of co-twin control can be used in the study of language behavior and many forms of motor performance such as ring tossing, walking board skill, and paper cutting; also memory recall of objects and numerals. Indeed the method is applicable to a great variety of conditions, physiological and functional. The method presupposes monozygotic twins whose thoroughgoing similarities are defined and established in advance. After this a specifically defined differentiation is imposed and put to comparative test.

With the support of cinema records made under standardized conditions, the scope of co-twin comparison can be widened to include constitutional differences which are manifested in distinctive individuality traits, both in spontaneous and experimental situations. Our cinema records of Twin T and C covered the period from early infancy to adolescence. When the films were carefully reviewed in ontogenetic sequence, it became evident that slight but consistent individual differences were present from the very beginning. These differences, carefully examined proved to be as intriguing as the striking resemblances.

We have found the cinema to be an indispensable instrument for the detailed analysis and comparative study of the behavior patterns of twins. The cinema film captures the behavior in its totality. It registers simultaneously the attitudes of head, trunk, hands, eyes, at successive intervals of time (0.067 seconds in our 16 mm records). It furnishes a flowing stream of frozen sections of motion.

Cinemanalysis is an objective research technique which capitalizes the almost magical time-space manipulability of flexible film to define the patterns of behavior in relation to spatial form and temporal sequences. The simplest device for accomplishing cinemanalysis is a portable projector, operated by a hand-crank, to throw a 4×5 inch image on a screen for close, intimate inspection. In this way the observer comes into close grips with the behavior record. He stills, starts, slows, speeds, and animates the successive images to suit his scientific interest. This is a method of dissection which brings behavior patterns into the realm of morphology and makes them almost as tangible as tissue. Just as histology serves the study of the anatomy and embryology of tissues and organs, so cinemanalysis can serve the investigation of the morphology of behavior.

The method of co-twin control and the method of cinemanalysis here briefly described can, of course, be used independently. But where the two methods are brought into conjunction, they reinforce each other and thereby sharpen our insight into the developmental mechanisms of the human action system.

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### RIASSUNTO

L'A. illustra l'opportunità della valorizzazione delle immagini cinematografiche per esaminare il comportamento dei gemelli. Egli si è servito di una coppia monozygotica femminile di 46 settimane. Di queste solo una è stata allenata nell'esercizio di salire sulle scale durante 6 settimane, mentre l'altra serviva come controllo. Nella 52ª settimana è stata offerta ad ambedue l'occasione di salire le scale, e il comportamento di entrambe le gemelle è stato ripreso cinematograficamente. Il metodo di controllo dei singoli membri e quello della cinemanalisi possono naturalmente essere valorizzati separatamente. Se però sono combinati si completano e si rafforzano reciprocamente.

### RÉSUMÉ

L'auteur décrit l'utilité de l'emploi des vues cinématographiques pour étudier le comportement des jumeaux. Il s'est servi de 2 jumelles monozygotiques âgées de 46 semaines; l'une a été entraînée pendant 6 semaines à grimper un escalier, tandis que l'autre servait comme moyen de contrôle. Dans le cours de la 52ème semaine on leur a fait grimper l'escalier à toutes les deux, et le comportement de l'une et de l'autre a été filmé. La méthode de contrôle de chacun des sujets et celle de l'analyse cinématographique peuvent naturellement être employées à part. Mais si on les combine elles se complètent et se renforcent mutuellement.

### ZUSAMMENFASSUNG

Der Autor beschreibt die Nützlichkeit der Verwendung von Filmaufnahmen zur Untersuchung des Verhaltens von Zwillingen.

Bei 46 Wochen alten weiblichen EZ wurde der eine Partner 6 Wochen hindurch im Treppenklettern geübt, während der andere als Kontrolle diente. In der 52. Woche wurde beiden Gelegenheit zum Treppenklettern geboten und das Verhalten der Zwillinge verfilmt. Die Methode der Kontrolle der einzelnen Zwillingspartner und diejenige der « Kinanalyse » können natürlich getrennt verwandt werden. Verbindet man sie aber, so ergänzen und bestärken sie sich gegenseitig und vertiefen unsere Kenntnis der Entwicklungsmechanismen des menschlichen Aktionssystems.

(Riassunti e traduzioni a cura della Redazione).