

BIOGRAPHICAL NOTE

Finnish Twin Research in the 1930s: Contributions of Arvo Lehtovaara and His Mentor, Eino Kaila

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We offer a brief sketch of an overlooked early twin researcher, Arvo Johannes Lehtovaara (1905–1985), Professor of Psychology at the University of Jyväskylä, 1939–1952, and the University of Helsinki, 1952–1970, with background notes on his mentor, Eino Kaila.

Arvo Lehtovaara was trained at the University of Helsinki, where Eino Kaila (1890–1958) had been appointed Professor of Theoretical Philosophy in 1930. There, he established the Institute of Psychology in 1931. A decade earlier, as a Professor of Philosophy at the University of Turku, he founded the first Finnish Institute of Psychology in 1921. Kaila was a charismatic teacher of Finland's first generation of psychologists; some consider him the founder of Finnish psychology. In 1934, he authored a textbook on personality (*Personallisuus*; Kaila, 1934). Kaila authored a textbook on Personality (*Personallisuus*) in 1934. The second edition was published in 1938, a year after his student, Lehtovaara, completed his doctoral thesis. One chapter in that edition, entitled 'Character and Heredity', discussed, in a surprisingly modern manner, the interplay of genetic and environmental factors in development. Kaila argued that personality characteristics are not directly inherited, but personality develops from dispositional reactions that are. He used the term 'reaction norm' to describe genetic effects on development. And citing T. H. Morgan, he sketched what is now recognized as a polygenic/pleiotropic view, dismissing the notion of single genes for single properties, echoing Morgan's ideas and arguing that every gene influences all properties and every property is dependent on all genes. Kaila then summarized twin methods, reviewing early reports of identical twins reared apart, and noted that many comparisons of reared-together twins reveal that averaged intra-pair differences of non-identical pairs double the difference observed within identical twin pairs. He considered

that environments created by reactions and interactions of genetically identical twins may enhance their similarities, but noted as well that measurement error may underestimate their true similarities. Kaila's conceptual framework and his understanding of twin methods provided the context for the work of his student, Arvo Lehtovaara. And very likely, Lehtovaara's dissertation results informed Kaila's understanding of the role of genetic dispositions in human development.

Lehtovaara's dissertation was defended in April 1937 and published the next year (Lehtovaara, 1938). Written in German, this very early laboratory study of twins was apparently designed to test Kaila's ideas on the heritability of individual differences in dispositional reactions. Largely overlooked today, its historical significance is that it pioneered twin research on distinctly *psychological* reactions (Ellis, 1940) with innovative, albeit limited, laboratory tests of social attachment, emotional reactivity, and eidetic imagery, supplemented with observations of intra-pair differences in early behavioral development, and measures of reaction time and intelligence. In the preface to his dissertation, Lehtovaara acknowledges that his laboratory studies were made possible by research instruments donated to the University of Helsinki's Institute of Psychology from the Rockefeller Foundation, presaging Finnish-American collaborations in twin research to follow.

The dissertation twin sample included 144 pairs to which two cases of like-sex triplets were added; 58 of the twin pairs were diagnosed as one-egg (EZ in German) and 72

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same-sex, two-egg (ZZ), and 16 were of opposite-sex. Twins up to age 6 years were found in parish records for births and baptisms; those aged 7–17 years came from school registers. Zygosity diagnoses were based on 10 measures of similarity in concurrent comparisons of both co-twins by two raters comparing facial features, hair and eye color, tooth structure, and information on chorion type; developmental differences in height and weight and confusion of identity by parents and relatives were noted.

Lehtovaara's more novel results were found in his laboratory tests of the similarity of 'mimical expressions' co-twins made in response to pictures of emotional content: 'without the test-persons' knowledge . . . mimical reactions were cinematographically recorded'; the resulting film photos (~30,000 single pictures) were evaluated for concordance of the intensity and character of mimical expression, a measure Lehtovaara concluded 'to be predominantly dependent on heredity'.

Retrospective reports of intra-pair differences in development between ages 3 months and 6 years were found to be twice as large in SS DZ pairs, and 3X as large in OSDZ pairs as those observed among MZ twin pairs 'with an obvious qualitative difference between the genetically similar and dissimilar twins'. In the concluding statement of the English summary of his dissertation, Lehtovaara states that 'intra-pair differences in the profiles of development are in general obviously smaller in identicals than in the fraternal and in the opposite-sexed twins'.

Intra-pair differences in tested IQ and in school reports from teachers were larger in fraternal twins and 'hereditary factors proved to be of great importance' in achievement in certain school subjects. Social attachment and frequency of shared activities was found to be more similar in MZ pairs, especially so among MZ twin sisters.

Lehtovaara joined the faculty at the University of Jyväskylä in 1939, but his academic/research career was immediately interrupted by his military service in Finland's armed conflict with Russia during the 'Winter' (1939–1940) and the 'Continuation' (1941–1945) wars, and later, he served as Vice Rector at the University, from 1947 to 1952. Only years after he secured a position at the University of Helsinki in 1952 did he return to twin research. He prepared a seven-part series of 'Psychological Studies on Twins' as short reports of 20–30 pages length. The dates and circumstances of data collection are unclear, and very little detail on the twin samples is reported; the series was published (in English) as departmental reports between 1965 and 1969, the year immediately prior to his retirement. The first of these short reports (Lehtovaara et al., 1965) evaluated genetic and environmental influences on amplitude and duration of galvanic skin responses to visual stimuli projected for duration periods of 15 s each. The stimuli were 12 color pictures of 'disturbing, neutral, or amusing' content. Four of the 12 pictures had been used

in his dissertation research published in 1938. Results were appropriately termed 'preliminary', but detailed raw score results were presented to 'encourage discussion [and] establish contact with . . . other investigators interested especially in problems of heredity/environment'. The GSR study was the second in which these twins participated; the first session assessed other reactions. Both sessions were 3–4 hours in length, so while the study sample was small, the research protocol was ambitious.

Published in German in the late 1930s, it is understandable that Arvo Lehtovaara's twin research is little known and rarely cited. His influence on Finnish psychology, however, was very substantial. His textbook, *Sielutiede* (Psychology; Lehtovaara, 1954) was widely read. It was the only textbook for psychology in higher secondary schools throughout Finland from the 1940s into the 1970s, read by tens of thousands of Finnish students preparing for their matriculation exam. The textbook publications of Lehtovaara and his mentor, Kaila, were translated into Swedish and Danish and became influential in Finland and its neighboring Nordic countries for decades.

The limited samples of twins and the largely qualitative comparisons of their intra-pair differences prohibit concluding much from Lehtovaara's dissertation research and his series of later short reports. But that fact does not diminish the historical importance of what he did. It is remarkable that as early as the mid-1930s, with mentoring by Professor Kaila, Lehtovaara chose for his dissertation a laboratory twin study of intra-pair similarities for emotional reactions, social attachment, and developmental milestones in early childhood. His research documents an early interest in twin studies and developmental behavior genetics among Finnish psychologists. Eighteen years later, the Finnish Foundation for Alcohol Studies appointed a research team to conduct a twin study on the 'inheritance of use of alcoholic beverages'; results from that first population-based Finnish twin study were published in 1966 (Partanen et al., 1966). That study and subsequent Finnish twin cohort research is well known to readers of this journal.

References

- Ellis, W. D. (1940). Book review of *Psychologische Zwillingsuntersuchungen*. *American Journal of Psychiatry*, 53, 157.
- Kaila, E. (1934). *Persoonallisuus [Personality]* (2nd ed., 1938). Helsinki, Finland: Otava.
- Lehtovaara, A. (1938). *Psychologische Zwillingsuntersuchungen [Psychological Twin Investigations]*. Helsinki, Finland: Die Finnische Akademie der Wissenschaften (Finnish Academy of Science and Letters).
- Lehtovaara, A. (1954). *Sielutiede [Psychology]* (8th ed.; 1st ed., 1945). Jyväskylä, Finland: Gummerus.
- Lehtovaara, A., Saarinen, P., & Järvinen, J. (1965). *Psychological studies on twins (I). GSR reactions: Environmental versus*

hereditary determination (Reports from the Psychological Institute). Helsinki: The University of Helsinki.

Partanen, J., Bruun, K., & Markkanen, Y. (1966). *Inheritance of drinking behavior: A study of intelligence, personality, and*

use of alcohol of adult twins (The Finnish Foundation for Alcohol Studies, Volume 14). Helsinki, Finland: Keskuskirjapaino.
