

Article

Nick Martin and the ‘Boulder Workshops’

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Abstract

The author provides a personal perspective on Nick Martin’s contributions to behavioral genetics and his role in the workshops on statistical genetics held annually in Boulder. Highlighted are Prof. Martin’s seminal work on multivariate behavioral genetics, his career-long commitment to the value of the study of twins, and his enthusiastic support of the didactic mission of the ‘Boulder workshops’. These contributions and activities continue unabated as we celebrate Prof. Martin’s 70th birthday.

Keywords: Martin; N.G.; twin study; statistical genetics; multivariate genetic analysis; biometrical genetics; behavioral genetics; workshop; Boulder

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I first encountered the irrepressible Nick Martin 47 years ago. He was working on his doctorate with Lindon Eaves at the University of Birmingham, UK, while I was a newly minted 21-year-old graduate of the Psychology Department in the process of ‘jumping ship’ by training for a Master’s degree in Applied Genetics — essentially biometrical genetics for those aspiring to careers in animal and plant breeding. That was not my intention, as I had already come under the spell of David Fulker’s charm, personal generosity and sharp intellect, and aspired to join the group of behavior geneticists that had formed in Birmingham. Along with David Fulker, these included John Jinks (Chair of Genetics and Lindon Eaves’ mentor), Peter Broadhurst (Chair of Psychology and an animal psychogeneticist, the term he preferred), David Hay (at that time working on the genetics of *Drosophila* behavior) and, of course, Lindon Eaves who was also my mentor for that year of training.

Into this milieu arrived an outgoing and outspoken Australian who was as determined as his mentor to make the classical twin study a rigorous, innovative and central research method in human behavior genetics. Like me, Nick Martin was fortunate to find in Lindon Eaves a mentor with the creative genius, mathematical sophistication and philosophical courage needed to guide the development of his own abilities and research program. Eaves’ doctoral thesis, ‘Aspects of Human Psychogenetics’ (Eaves, 1970) completed not long before, and Nick Martin’s own dissertation — ‘The classical Twin Study in Human Behavior Genetics’ (Martin, 1976) — could have served as a prescient call for the methodological developments and training that later developed into the workshops on the ‘Methodology for Genetic Studies of Twins and Families’.

These workshops were first held in Leuven, Belgium, in 1987, 1989 and 1991, organized by Robert Derom and his colleagues under the auspices of the NATO Advanced Study Institutes, and

in 1990 and then from 1992 onwards, with funding from the US National Institute on Mental Health (NIMH), annually in Boulder, Colorado. For many years, they were known affectionately as the ‘Twin Workshops’ and, now that the subject has advanced into the genomic era, simply the ‘Boulder Workshops’. This series is the longest running workshop on behavior genetic methodology, motivating many of its participants to become researchers in behavior genetics (for better or worse).

The workshops have a long history of teaching methods and topics at the forefront of the field, introducing new approaches to the genetics community, and inspiring collaborations. The workshop has resulted in the publication of two special editions of the journal *Behavior Genetics*, the first edited by Nick Martin, Dorret Boomsma and Mike Neale in 1989, and two textbooks. *Methodology for Genetic Studies of Twins and Families* (Neale & Cardon, 1992), based on the workshops and written by their faculty, became the standard reference for structural equation modeling in behavioral and psychiatric genetics. A second textbook, *Statistical Genetics: Gene Mapping Through Linkage and Association* (Neale et al., 2007), addressed the field of genomics that, at that time, was just emerging as a real force in complex trait analysis. To give a sense of the timeliness of the content of the workshops, the second textbook included a chapter (by Patrick Sullivan and Shaun Purcell) on ‘Analyzing Genome-Wide Association Study Data: A Tutorial Using PLINK’. This was at a time when only two genomewide association studies (GWAS), of macular degeneration, had been published, and prior to the publication of the first ever large-scale GWAS (Wellcome Trust Case Control Consortium, 2007).

From the very beginning, and throughout the history of the workshops over the past third of a century, Nick Martin has been perhaps their most enthusiastic supporter and advocate, as well as a very active participant. He is one of the few faculty to have attended every single workshop to date, and he has always been ready to present the latest developments from his research group (often on a Friday afternoon when it has now become a tradition to wrap up the workshop with short overviews of what research most excites the faculty). Perhaps more importantly, he has shaped

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the workshops with his strong convictions about what the workshops' goals for the students should be; he is, perhaps as much as any of the faculty, firmly committed to their didactic mission. Nick has always found a way to bring his students to the workshops, and his reward has been watching them advance from students to faculty to directors of the workshop — Sarah Medland and Dave Evans are two of Nick's former students who currently share the workshop academic leadership with Mike Neale and Ben Neale.

In Nick's view, if one can presume to speak for him, the first goal of the workshop should be to instill a clear sense of what the central methods of biometrical behavior genetics can tell us. No one should leave the workshop after the first day without this basic understanding. This is essential, whether achieved through the straightforward ACE model analysis of the classical twin study, or through tracing the historical development of the subject from Mendel, Galton and Fisher through to GWAS and sequencing. Nick has always been an enthusiast for summarizing the first day's work on the whiteboard, prompting students to share their results and hazard their interpretations of what they might mean. Technicalities are important of course, but not at the expense of grasping what the results are telling us — is the trait under study influenced by genetics, by shared family environments, a lot, a little, or not at all? Why? How can we know this?

The second goal of the workshop should be to present a state-of-the-art version of what was one of the most significant advances in the field of behavior genetics, developed in Nick's doctoral thesis and published in the seminal paper, 'The Genetical Analysis of Covariance Structure', by Martin and Eaves (1977). Multivariate genetic and environmental analysis was, arguably, one of the most consequential advances in our field, leading to the wide application of structural equation modeling for twin and family study data and, most recently, genomic data.

Whenever we have been tempted to crowd out either of these two goals to make room for the myriad technical advances in our subject, Nick has reminded us that these central themes form the basis of our subject and our workshops should emphasize them just as much as the rapidly occurring and powerful new developments.

Alongside the academic goals of the workshops, Nick firmly believes in the value of the social interactions that the workshops encourage in a way that few other learning experiences can. This is how scientific collaborations and personal relationships can get their start, and new ideas, research projects and publications can follow. To facilitate this, Nick is the ready and willing cheerleader for faculty and student introductions on the first day, emphasizing the remarkably international and, indeed, multinational background of many of the workshop faculty, and calling on the students who work in similar research areas to identify themselves and recognize their potential new colleagues. It helps to be an extrovert and to have an energy level that is still phenomenal even as Prof. Martin celebrates his 70th birthday. After a full day traveling from Brisbane to Boulder, many of us would just want to crash out in our hotel room. But one of the attractions of the Boulder is that there is a ski resort an hour away and that is where you will likely find Nick in the time available between his arrival in Boulder and the first meeting of the workshop faculty to finalize the program for the coming week.

Happy 70th Birthday, Nick, from all of us at the Boulder workshop!

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