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David Galbraith is Associate Professor of Psychology in Southampton Education School at the University of Southampton, and is currently the coordinator of the Learning Knowledge and Behaviour pathway for the ESRC-funded South Coast Doctoral Training Partnership. He is a psychologist by training and teaches cognitive psychology, research methods and the psychology of literacy on undergraduate, masters and postgraduate programmes. His main research interests are in the psychology of writing and the development of understanding through writing. This involves basic research into the cognitive and social processes involved in writing, and is focussed on the development of a dual process model of writing (Galbraith & Baaijen, 2018). Insights from this model are applied to research into the teaching of writing; the use of writing as a tool for learning, particularly in science learning; the effects of dyslexia on writing; and the therapeutic effects of expressive writing. David is Associate Editor of the open-access *Journal of Writing Research*, a member of the editorial boards for the *Journal of Educational Psychology*, *Learning and Instruction* and *Educational Research Review*, and a member of the editorial board for the *Studies in Writing* book series. He regularly reviews papers for a range of other journals.

Aligning keystroke logging data with writing processes: Methodological reflections for future research on L2 writing processes

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Keystroke logging provides a detailed record of the process of writing as it unfolds in time. However, we have argued (Baaijen, Galbraith & de Glopper, 2012; Galbraith & Baaijen, 2019) that, by themselves, the measures it provides – pauses, bursts and revisions – do not provide an unambiguous interpretation of the cognitive processes involved.

In this talk, I will first discuss how keystroke measures can be mapped on to the cognitive processes identified in cognitive models. I will argue that, in order to interpret these measures, measures should not be aggregated across keystroke logs as a whole, but instead should be analysed separately depending on the context within writers' overall drafting strategy. In particular, Baaijen et al. (2012) distinguish between linear transitions made at the leading edge of the text and non-linear transitions made during either the production of an initial draft or the revision of text.

I will then suggest that traditional measures of central tendency do not capture distinctions between different types of pause, and demonstrate how mixture models (McLachlan & Peel, 2000) can be used to better identify sub-components of pause distributions at different text boundaries. Data from a study in progress indicate, for example, that three different types of pauses between words and two different types of pauses between sentences can be distinguished in the keystroke logs of L1 writers. I will assess whether the same range of distributions can be identified in L2 writing.

I will conclude by identifying two dimensions of the writing process – *global linearity* and *sentence production* – and present evidence that these have systematic relationships with text quality and writers' subjective experience of the development of understanding. A key finding in previous research (Baaijen & Galbraith, 2018) is that the same keystroke measures show different relationships with text quality and the

development of understanding depending on the type of planning carried out in advance of writing. This implies that the same keystroke measure reflects different cognitive processes in different contexts. I will argue that, in order to interpret keystroke logs, we need to combine keystroke logging with theoretically-informed experimental manipulations of the writing process.